

BRYOZOA FROM HERON ISLAND, GREAT BARRIER REEF. 2

P.J. HAYWARD & J.S. RYLAND

Hayward, P.J. & Ryland, J.S. 1995 12 01: Bryozoa from Heron Island, Great Barrier Reef. 2. *Memoirs of the Queensland Museum*. 38(2):533-573. Brisbane. ISSN 0079-8835.

Forty-six species of Bryozoa are reported from shallow reef habitats of Heron Island, Queensland. Twenty new species are described: *Chaperiopsis harmeri*, *Beania pectinata*, *Thairopora calcarata*, *Exechonella ampullacea*, *Celleporaria hesperopacifica*, *C. sicaria*, *Calyptotheca rupicola*, *Robertsonidra praecipua*, *Cheiloporina campanula*, *Stylopoma herodias*, *Nimba saxatilis*, *Cigclisula fruticosa*, *Smittoidea incucula*, *Pleurocondonellina laciniosa*, *Fenestrulina epiphytica*, *Celleporina bellatula*, *C. cochlearia*, *C. fistulata*, *Iodictyum mamillatum* and *I. receptaculum*. Five species are reported for the first time from Australian waters. □ *Heron Island, Great Barrier Reef, Bryozoa, taxonomy.*

P.J. Hayward & J.S. Ryland, Marine and Environmental Research Group, School of Biological Sciences, University of Wales, Swansea, Singleton Park, Swansea SA2 8PP, United Kingdom; 1 September 1995.

Tropical bryozoan faunas are rich in species but poorly known taxonomically. Current knowledge is still largely founded on a very few monographic accounts (e.g., Canu & Bassler, 1929; Harmer, 1915, 1926, 1934, 1957), the usefulness of which is limited by the vast geographical areas they cover, and by their outdated and conservative taxonomy. Bryozoans are especially abundant in coral reef communities where they are an important part of cryptic, sessile faunas. Yet, as Winston (1986) showed, a century of ecological research into reef-associated faunas resulted in a world-wide checklist of just 284 species of Bryozoa. It had been assumed that bryozoans were of little consequence in reef ecosystems, largely through unfortunately biased collecting (Winston, 1986), and it was not until reef ecologists began to examine sessile reef communities that their true significance began to be revealed (e.g., Jackson & Winston, 1982). Faunistic studies of limited areas of reef (e.g., Hayward, 1988), and systematic revision of selected genera in limited geographical areas (e.g., Soule & Soule, 1973) continue to emphasize the abundance and taxonomic variety of coral reef-associated Bryozoa, and the present inadequate level of systematic study devoted to them. The bryozoan fauna of the Great Barrier Reef is especially rich. It certainly exceeds several hundred species, but the total cannot be estimated. In the first account of the bryozoan fauna of Heron Island reef flat (Ryland & Hayward, 1992), 81 species were described, of which 24 were recorded for the first time from Australian waters and 14 were new. A further 43 species are described and illustrated in this paper, together with three others noted or incorrectly identified in the previous paper (Ry-

land & Hayward, 1992). Of this total, 20 are new to science, while another five are reported for the first time from Australia.

A general account of Heron Island reef and the collecting sites worked were given in the first paper, together with details of 14 of the 28 stations sampled in 1972 and the occurrence of *Sargassum* sp. in 1988. Notes on the remaining 1972 stations, and on a further group of stations worked in 1988 are given in Appendix 1. All collecting sites are mapped in Fig. 1.

SYSTEMATICS

The taxonomic order adopted here follows that advocated by Gordon (1984, 1986, 1989a). Taxonomic diagnoses are presented at family and genus level, except where these have already been provided in the previous account (Ryland & Hayward, 1992). Species descriptions and measurements are based on Heron Island specimens. The synonymies given for each species are deliberately selective, and unverified synonyms have been excluded.

Class STENOLAEMATA Borg, 1926
Order CYCLOSTOMATIDA Busk, 1852a
Family FILISPARSIDAE Borg, 1944

DIAGNOSIS

Colony erect, branching, with flattened branches. Autozooids arranged in quincunx, or in transverse rows. Gonozooid frontal, partially immersed, often indistinct.

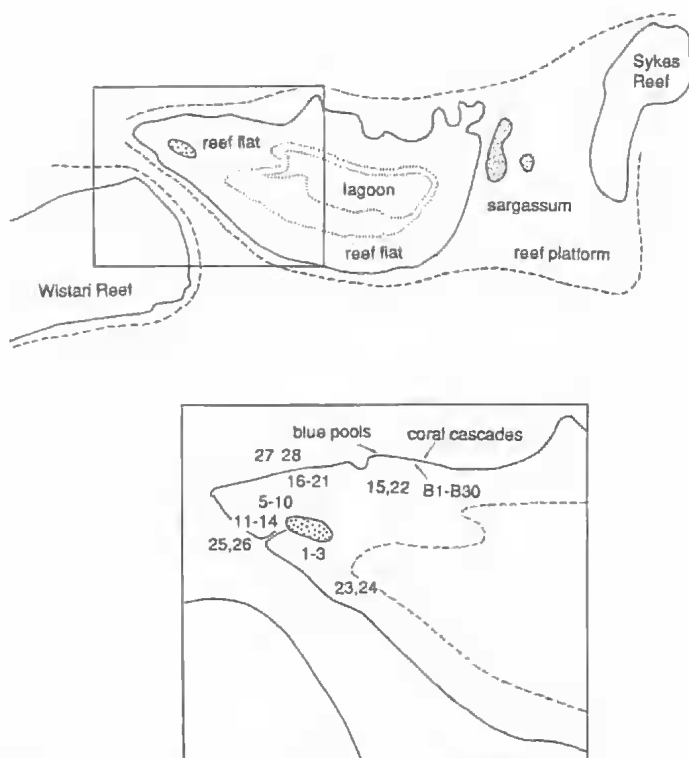


FIG. 1. Heron Island and reef, showing location of samples.

Nevianopora Borg, 1944

TYPE SPECIES

Idmonea milneana d'Orbigny, 1839.

DIAGNOSIS

Colony erect, branching dichotomously, with flat basal surfaces. Autozoid orifices in regular transverse rows, the median one slightly more proximally situated than those on either side. Gonozoid frontally situated at a branch dichotomy, irregular in outline, the ooeciostome shortly tubular and flared.

**Nevianipora pulcherrima (Kirkpatrick)
(Fig. 2A)**

Idmonea pulcherrima Kirkpatrick, 1890a: 22, pl. 4, fig. 6.

Tubulipora pulcherrima (Kirkpatrick) Harmer, 1915: 129, pl. 9, figs. 1-5.

Nevianopora pulcherrima (Kirkpatrick) Brood, 1976: 292, fig. 12H,L.

MATERIAL EXAMINED
Stn. 27.

REMARKS

A single colony was collected from Stn. 27, encrusting *Iodictyum receptaculum* sp. nov.

DISTRIBUTION

Described originally from the Torres Straits, *N. pulcherrima* is widely distributed through the Indo-Malayan region, and westwards to the coasts of East Africa. It will probably prove to be common throughout the northern GBR province.

Family LICHENOPORIDAE

Smitt, 1867

Disporella Gray, 1848

TYPE SPECIES

Discopora hispida Fleming, 1828.

DIAGNOSIS

Colony encrusting, discoidal or cup-shaped, with a thin peripheral lamina. Autozooids in radiating or quincuncial series; linked by calcified struts defining alveoli, extrazooidal coelomic spaces. Alveoli progressively reduced by centripetal calcification but not closing completely, retaining a central foramen. Embryos brooded in extrazooidal brood chambers in the central region of the colony; embryos released through a short, tubular, upwards-directed ooeciostome.

**Disporella buski (Harmer)
(Fig. 2B-D)**

Lichenopora buski Harmer, 1915: 161, pl. 12, figs 4,5.
Disporella buski (Harmer) Brood, 1976: 299, figs 17D-G.

DESCRIPTION

Colonies circular, developing a deep cup-shape, up to 3.5mm diameter. First three or four astogenetic generations of autozooids ordered in radiating linear series; thereafter diverging and adopting a regular quincuncial arrangement. Autozoid tubes more or less oval in section, to 0.08mm wide; especially long in deepest part of cup, the distal lip drawn out into two or three slender, spinous processes. Short spines also

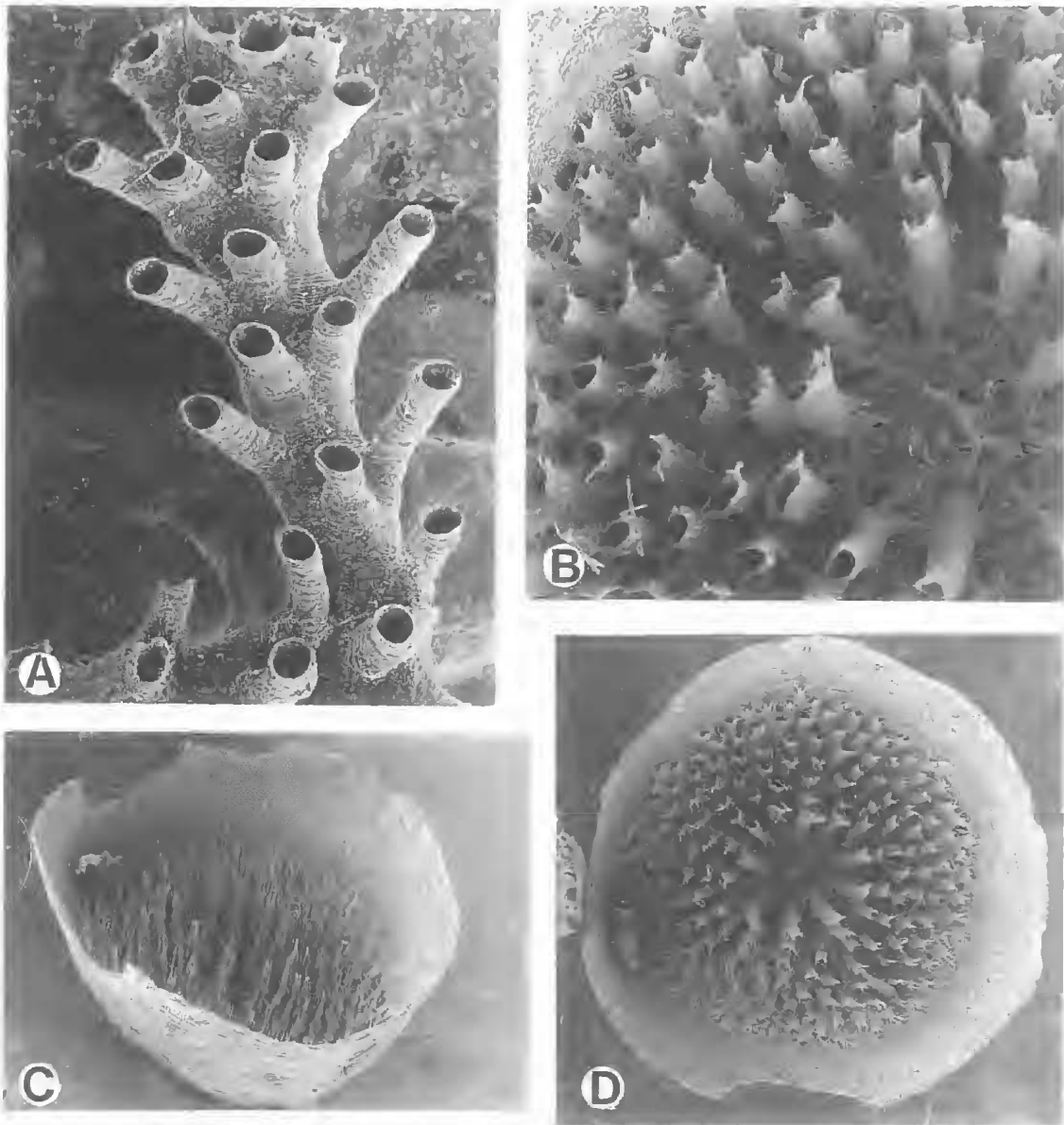


FIG. 2. A, *Nevianipora pulcherrima*, x34. B-D, *Disporella buski*. B, part of colony, with ooeciostome, x40. C, entire colony in oblique lateral view, x14. D, entire colony viewed from above, x15.

present on the upper surface of the autozoid tube. Brood chamber apparent as a finely perforated sheet underlying calcified struts linking the bases of the central autozoid tubes; ooeciostome short, round-sectioned, its aperture level with the surface of the chamber.

REMARKS

Numerous cup-shaped colonies of this species were present on *Sargassum*, sometimes closely intergrown with encrusting cheilostomates. The spinous peristomes and the finely perforated brood chamber are characteristic for *D. buski*, as is the short, round-sectioned ooeciostome.

DISTRIBUTION

Described originally from the Indo-Malayan region, *D. buski* is widely distributed in the western Pacific, from New South Wales to Japan, and has been recorded from a dozen localities on the East African coast (Brood, 1976). It is common in the Torres Straits, and probably throughout the GBR province.

Family CRISIIDAE Johnston, 1838

DIAGNOSIS

Colony erect, branching, jointed; each internode of one to many tubular autozooids, all frontally facing, linked by chitinous, tubular nodes. Gonozooid inflated, replacing an autozooid, with densely punctate calcification; oeciostome distally situated, slit-like, tubular or flared.

Crisia Lamouroux, 1812

DIAGNOSIS

Sterile internodes consist of at least three, to more than 30 autozooids; fertile internodes (bearing gonozooids) with at least five autozooids. Basally jointed spines present in many species.

TYPE SPECIES

Sertularia eburnea Linnaeus, 1758.

Crisia elongata Milne Edwards
(Fig. 3A)

Crisia elongata Milne Edwards, 1838: 203.

Crisia elongata Milne Edwards, Harmer, 1915: 96, pl. 8, figs 1-8; Gordon, 1989b: 448, figs 1, 2.

REMARKS

This widely distributed tropical crisiid is recognized by its curled branches, black joints, and broad, globular gonozooid, which has a narrow, slit-like oeciostome. It has been widely recorded from reef habitats in the Indo-West Pacific region, as well as from Samoa, and East Africa. Several colonies were found attached to *Sargassum* leaflets.

Bicrisia sp.
(Fig. 3B)

REMARKS

Several small colonies of *Bicrisia* were present in the sample of *Sargassum*. Unfortunately, none bore gonozooids, without which the species' identity cannot be established.

Class GYMNOLAEMATA Allman, 1856
Order CHEILOSTOMATIDA Busk, 1852a
Suborder INOVICELLINA Jullien, 1888
Superfamily AETEOIDEA Smitt, 1867
Family AETEIDAE Smitt, 1867

DIAGNOSIS

Colony encrusting, creeping; consisting of tubular autozooids, each with a decumbent proximal portion, and an erect tubular portion bearing distally the frontal membrane and operculum. The adherent proximal portions constitute a ramifying, stolon-like growth, filiform or moniliform. The polypide occupies the whole of the autozooid, and may be withdrawn into the encrusting, proximal part. The everted tentacle sheath has a finely toothed collar. Embryos brooded in membranous, evanescent ovisacs, attached at the distal end of the autozooid.

Aetea Lamouroux, 1812

TYPE SPECIES

Sertularia anguina Linnaeus, 1758.

DIAGNOSIS

As for family.

Aetea anguina (Linnaeus)
(Fig. 3D)

Sertularia anguina Linnaeus, 1758: 816.

Aetea anguina (Linnaeus) Harmer, 1926: 194, pl. 13, figs. 3, 4; Ryland & Hayward, 1977: 45, fig. 13.

REMARKS

Dense colonies of this species were abundant on *Sargassum*, while more diffuse and smaller colonies occurred in the interstices of coral rubble. *Aetea anguina* appears to have a worldwide distribution, except for polar seas. It is distinguished from other species of the genus by its variably flexed, spatulate distal end. The Heron Island specimens differed from European specimens in displaying variation in the length of the closely ringed erect portion of the autozooid, below the frontal membrane. This varied by as much as 100% among autozooids of a single colony. The shorter individuals, with reflexed, spatulate distal ends could not be distinguished from European *A. anguina*. Species of *Aetea* are probably common in cryptic reef environments, but their delicate colonies are usually damaged beyond identification by collection.

Suborder MALACOSTEGINA Levinsen, 1909
 Superfamily MEMBRANIPOROIDEA
 Busk, 1854
 Family MEMBRANIPORIDAE Busk, 1854

DIAGNOSIS

Colony an encrusting, unilaminar sheet; in some species developing erect, foliaceous, bilaminar sheets from an encrusting base. Autozooids lightly calcified, with little or no gymnocystal calcification; the frontal surface almost entirely membranous. A small area of cryptocystal calcification present below the membrane in some species. Tubercles typically present at the proximo-lateral corners of autozooids, often well developed; small marginal spinules may border the opesia. No avicularia or ovicells. Interzooidal communication achieved via multiporous septula. Larva a planktotrophic cyphonautes.

Membranipora de Blainville, 1830

TYPE SPECIES

Flustra membranacea Linnaeus, 1767.

DIAGNOSIS

Characters of the family. Most species are epiphytic. The larva gives rise to a twinned ancestrular zooid.

Membranipora tuberculata (Bosc)
 (Fig. 3C)

Flustra tuberculata Bosc, 1802: 118.

Membranipora tuberculata (Bosc) Osburn, 1950: 23, pl. 2, figs 4-6; Mawatari, 1974: 23, fig. 2; pl. 2, figs 1-4.

REMARKS

Small colonies of this species were common on *Sargassum* sp. At the growing edge the plate-like gymnocyst of developing autozooids could be seen enrolling on each side to form the rounded tubercles characteristic of later ontogeny, in the manner described and figured by Osburn (1950) and Mawatari (1974). The narrow cryptocyst bore a few marginal spinules in some autozooids.

DISTRIBUTION

M. tuberculata is "found wherever *Sargassum* drifts over the warmer seas..." (Osburn, 1950). It has not been previously noted from Australia, but is certainly common throughout the western Pacific.

Family ELECTRIDAE Stach, 1937

Colony encrusting, forming a unilaminar sheet; or developing erect, bilaminar lobes or sheets from an encrusting base. Autozooids with well developed gymnocyst, perforate or imperforate, but only a minimal development of the cryptocyst. Spines generally present, though sometimes reduced: a single medio-proximal spine, often very long, occurs in almost all species; additional marginal spines bordering the opesia variably developed. No avicularia or ovicells. Interzooidal communication via multiporous septula. Larva a planktotrophic cyphonautes, giving rise to a single ancestrular zooid.

Electra Lamouroux, 1816

TYPE SPECIES

Flustra pilosa Linnaeus, 1767.

DIAGNOSIS

As for family.

Electra bellula (Hincks)
 (Fig. 4A)

Membranipora bellula Hincks 1881, 149, pl. 8, figs 4, 4a, 4b.

Electra bellula (Hincks) Cook 1985, 89.

REMARKS

Electra bellula does not seem to have been recorded again from Australia since Hincks' (1881) original account, although Livingstone (1927) regarded Haswell's (1881) *Membranipora cervicornis* as belonging to it. Hincks (1881) described the nominate species and var. *multicornis* from unknown Australian localities, and var. *bicornis* from Ceylon. He also recorded the nominate species from Madagascar, St. Vincent and the Cape Verde Islands. Hastings (1930) described and figured *Electra bellula* var. *bicornis* (Hincks) from the Galapagos Islands; Cook (1985) described West African specimens and reviewed the geographical distribution of the species.

The autozooids are 0.4-0.5mm long, with a smooth gymnocyst bearing medially a long, horny, basally pointed spine, characteristic of the genus. The oval opesia, which comprises half the total autozooid length has two to four flat, variably branched spines along its proximal edge, which are curved over the frontal membrane,

forming a closely reticulate shield. There are four or five thin, erect, reflected oral spines, and additional short, thin spines may occur elsewhere on the gymnocyst or along the margins of the autozoid. At Heron Island it occurred only on *Sargassum*, although Cook (1985) reported it encrusting hard substrata. Development of the overarched opesia spines varies between colonies and the varietal distinctions '*bicornis*' and '*multicornis*' are almost certainly without geographical or genetic justification.

Suborder NEOCHEILOSTOMINA
d'Hondt, 1985

Superfamily CALLOPOROIDEA
Norman, 1903

Family CALLOPORIDAE Norman, 1903

Parellisina albida (Hincks)

Membranipora albida Hincks, 1880: 81.

Parellisina albida (Hincks) Osburn, 1949: 4, fig. 8.

Parellisina curvirostris Ryland & Hayward, 1992: 229, fig. 2d.

REMARKS

This species was incorrectly identified as *P. curvirostris* (Hincks) by Ryland & Hayward (1992). *P. albida* is distinguished from *P. curvirostris* by its avicularium, the mandible of which has wide basal extensions, above which it abruptly narrows. It was common at Heron Island, occurring in nine samples.

DISTRIBUTION

Presently known only from an unrecorded Indo-Malayan locality ("Singapore or Philippines" (Hincks 1880)). The *P. albida* described and figured by Mawatari & Mawatari (1930) from Japanese localities has an extremely large avicularian chamber and the mandible lacks the latero-basal lobes of Hincks' species; it is almost certainly distinct from *P. albida* (Hincks). This is the first Australian record of the species.

Family CHAPERIIDAE Jullien, 1881

DIAGNOSIS

Colonies encrusting; or erect, foliaceous or branching. Autozooids with variably developed cryptocyst, opesia occupying one-fifth to two-thirds frontal length. No gymnocyst. Occlusor laminae - calcified struts marking position of opercular occlusor muscles - present within cav-

ity of zooid. Spines, ovicells and avicularia present or absent.

Chaperia Jullien, 1881

TYPE SPECIES

Flustra acanthina Lamouroux, 1825.

DIAGNOSIS

Colony encrusting. Autozooids with membranous frontal wall, partly underlain by a smooth or granular cryptocyst; opesia subcircular, occupying up to two-thirds frontal length. No gymnocyst. Obliquely orientated occlusor laminae present within opesia, extending from proximo-lateral corners to distal wall of autozoid. Spines present bordering the lateral and distal rim of the opesia. No avicularia. No ovicells. Multiporous septula present in vertical walls.

Chaperia sp.
(Fig. 5A)

MATERIAL EXAMINED

A single small colony on *Sargassum* sp.

REMARKS

This is possibly the same species as that recorded from various Indo-Malayan localities as *Chaperia acanthina* (Lamouroux), for example by Harmer (1926). *C. acanthina* is a southern hemisphere, cold temperate species, distributed from the Falkland Isles to Kerguelen and southern New Zealand (Gordon, 1986). It is characterized by a broadly oval, thick-rimmed opesia, constituting about half the total length of the autozoid, and a distal row of five to seven spines. Its occlusor laminae are long, and almost parallel to the disto-proximal axis of the autozoid, widely spaced where they intersect the distal wall. The Heron Island species has rather small autozooids, commonly 0.45 x 0.3mm, with an oval opesia occupying about two-thirds autozoid length. There are 10-13 distal spines, some borne on the rim of the opesia, and some issuing from the distal wall. It closely resembles the specimens figured by Harmer (1926, pl.14, figs. 9,10) and Scholtz (1991) as *C. acanthina*. *Chaperia judex* (Kirkpatrick), recorded from Mauritius and the Philippines (Hayward, 1988) is another tropical species formerly confused with *C. acanthina*. It has 15 or more stout spines almost completely enclosing the opesia. The Heron Island material is insufficient to give a complete description of a new taxon; it is obvi-

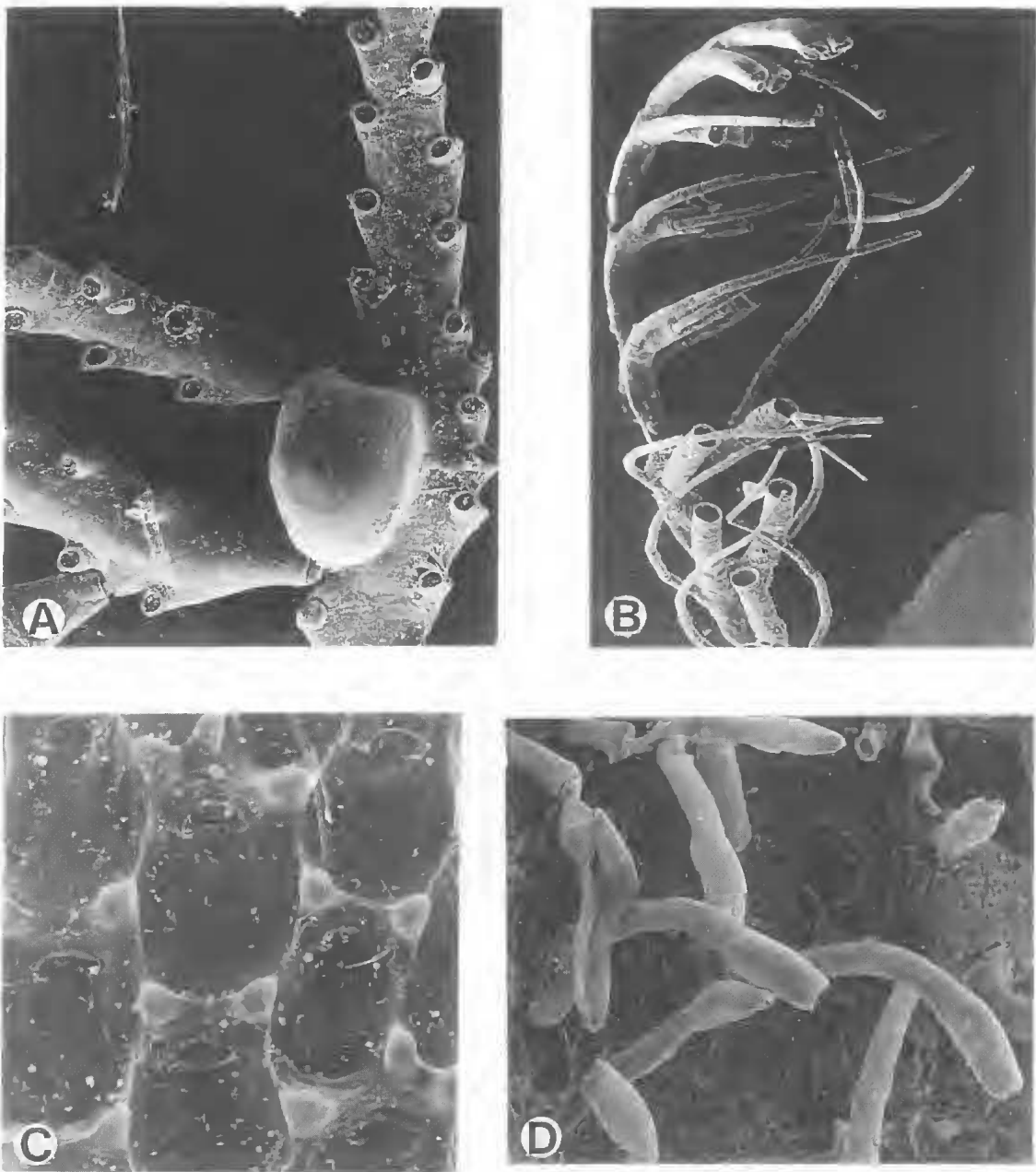


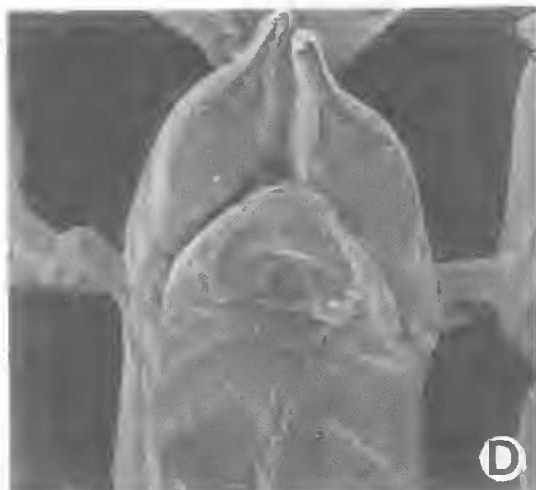
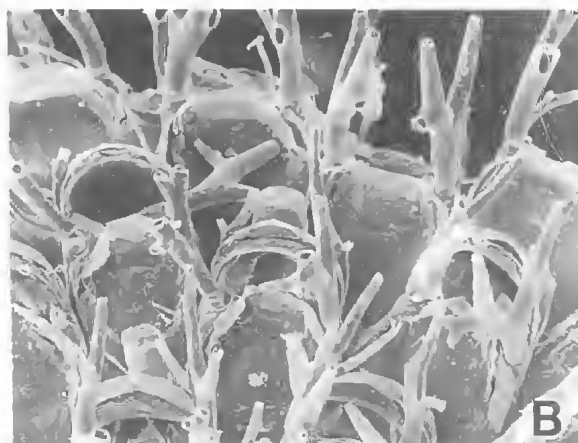
FIG. 3. A, *Crisia elongata*, x50. B, *Bicrisia* sp., x50. C, *Membranipora tuberculata*, x70. D, *Aetea anguina*, x70.

ously different from *C. acanthina*, but a formal description must await the discovery of further material.

***Chaperiopsis harmeri* sp.nov.**
(Fig. 4B,C)

Chaperia cervicornis: Harmer, 1926: 230, pl.14, fig. 8.

MATERIAL EXAMINED
HOLOTYPE: QMG304963, on *Sargassum* sp.



PARATYPES: QMG304968, on *Sargassum* sp.

DESCRIPTION

Colonies developing small, unilaminar patches. Autozooids oval, small, commonly 0.45 x 0.3mm, with an almost circular opesia comprising just less than half total length; proximal calcification thin and finely granular. There are four (rarely six) distal spines: proximal pair fairly stout, bifurcating three or four times to develop an open-branched antler shape, the tines cylindrical; distal pair shorter and thinner, bifurcated once or twice. At the growing edge some autozooids have a third pair of very thin spines projecting almost horizontally from the distal wall. Occlusor laminae very short, and indistinct; widely spread apart, passing between the bases of the proximal and distal spine on each side. Ovicell a shallow helmet shape, with a very large aperture, above this is a narrow, transverse frontal fenestra. The distal pair of spines curves along the sides of the ovicell. Avicularia rare, shortly columnar, present on the gymnocyst of autozooids succeeding an ovicell, projecting above the ovicell, with a short, proximally-directed mandible.

REMARKS

This is undoubtedly the species described and figured by Harmer (1926) as *C. cervicornis* (Busk). Gordon (1986) remarked that Harmer's specimens, from the Torres Straits, were probably distinct from *C. cervicornis*, which ranges from the Bass Strait and Tasmania, south to New Zealand, and west to the Magellan Strait. *C. cervicornis* has six to eight rather stout, cervicorn spines; the proximal pair are usually broadened with the tines flexed medially and meeting above the frontal membrane.

ETYMOLOGY

For S.F. Harmer.

Family QUADRICELLARIIDAE Gordon, 1984

Nellia Busk 1852a
Nellia simplex Busk
(Fig. 4E,F)

Salicornaria marginata Busk, 1852a: 367.

Nellia simplex Busk, 1852b: 19, pl. 65, fig. 1; pl. 65 (bis), fig. 3.

Acanthodesia simplex (Busk) Harmer, 1926: 220, pl. 13, fig. 23.

MATERIAL EXAMINED

Stns. 25b, 28.

DESCRIPTION

Colony a dense, bushy tuft, 55mm high, branching dichotomously at intervals of 1-4mm; attached by a thick bundle of tubular rhizoids. Branches square-sectioned, 0.3mm wide, consisting of four longitudinal autozoid series, in two back-to-back pairs. Joints flexible; dichotomies continuously calcified when first formed, but fracturing across base of each new ramus, the joints then formed from thick chitinous tubes. Autozooids oblong, 0.5-0.65 x 0.3mm; frontal surface largely membranous, bounded by narrow, smoothly calcified rim of lateral wall, and with a small, triangular area of gymnocystal calcification on each proximo-lateral corner. Cryptocyst smooth, imperforate, concave, underlying about one-third total length of frontal membrane; a similar-sized shelf of interior calcification occupies the distal third of the autozoid cavity, but at a lower, i.e., more basal, level than the cryptocyst. Latero-basal walls meet in a pronounced suture along the midline of the autozoid. Large, multiporous septula present on lateral walls. Ovicell distinctive, wider than long, smoothly calcified and imperforate; protruding into the cavity of the distally succeeding autozoid, the vertical, lateral walls of which enclose the ovicell on each side, and extend as narrow tongues across the distal edge of the ovicell, fusing and defining the opesia of the distal autozoid. Avicularia absent. Small, triangular foramina in one or both of the proximo-lateral corners of some autozooids mark the origins of the long, tubular rhizoids, which grow basally, closely applied to the surfaces of the branches, and gather to form the rooting bundle.

REMARKS

A single, large, profusely branched colony was collected from Stn. 25b, and several small colonies from Stn. 28. *Nellia simplex* was described from the Torres Straits by Busk (1852b) and listed by Kirkpatrick (1890b) in his report on the Torres

FIG. 4. A, *Electra bellula*, x160. B,C, *Chaperiopsis harmeri*; autozooids at the colony edge, x60. C, detail showing ovicells and an avicularium, x93. D, *Beania magellanica*, x110. E,F, *Nellia simplex*. E, autozooids at a branch dichotomy, x70. F, ovicelled autozooids, x40.

Straits collections made by A.C. Haddon in 1888-1889. Harmer (1926) founded his account on the fragmentary specimens described by these two authors, and the species does not seem to have been described subsequently.

Superfamily BUGULOIDEA Gray, 1848
Family BEANIIDAE Canu and Bassler, 1927

***Beania magellanica* (Busk)**
(Fig. 4D)

Diachoris magellanica Busk, 1852b: 54, pl. 67, figs 1-3.

Beania magellanica (Busk) Ryland & Hayward, 1992: 235.

REMARKS

This widely distributed species was described by Ryland & Hayward (1992) but not illustrated. The specimen figured here is part of a large colony from Station 23.

***Beania ?plurispinosa* Uttley & Bullivant**
(Fig. 5B)

Beania plurispinosa Uttley & Bullivant, 1972: 28, Gordon, 1984: 46, pl. 12, figs A-C.

MATERIAL EXAMINED
Stn. 88 B1.

REMARKS

A single, minute specimen of an especially spiny *Beania* was collected at Stn. B1. The operculum and frontal membrane are bordered by very long, thin spines, and numerous similar spines cover the basal walls of the autozooids. The species is closely similar to the Kermadec Ridge specimen figured by Gordon (1984, pl. 12, fig. B), but the Heron Island specimen consisted of no more than 10 autozooids and a firm identification cannot be given.

***Beania pectinata* sp. nov.**
(Fig. 5C,D)

MATERIAL EXAMINED
HOLOTYPE: QMG304961, on *Sargassum* sp.

DESCRIPTION

Colony diffuse, consisting of tapered, fusiform autozooids, 0.6mm long, standing erect on an adherent stolon, 0.05mm wide, which comprises the proximal portions of the autozooid. Frontal

membrane of autozooid entirely concealed by an almost flat shield formed from two comb-like rows of lateral spines, touching but not fusing along the midline of the autozooid. Operculum terminal, as wide as long; four short, slender processes spaced around the orifice rim: two distal and two lateral. Basal wall of autozooid smooth; no avicularia. Each autozooid has four basal connecting tubes: its own proximal portion, a distal tube representing the proximal portion of the next autozooid, and a short tube on each side, either or both of which may develop into a lateral autozooid. Ovicells were not present.

REMARKS

The four basal connecting tubes, comb-like frontal shield, smooth basal wall and lack of avicularia together distinguish this species from all other described species of *Beania*.

ETYMOLOGY

Latin *pectinatus*, comblike.

***Beania klugei* Cook**
(Fig. 6A,B)

Beania klugei Cook, 1968: 164, figs 2A,B.

MATERIAL EXAMINED
Stn. 29.

DESCRIPTION

The colony forms diffuse, branching, uniserial chains of slender autozooids, creeping across the surface of coral rubble. Autozooids are 0.8-0.9 x about 0.25mm, more or less parallel-sided, but strongly tapered in the proximal one-fifth; the frontal surface is entirely membranous. Spines are lacking, except for a pair of short, pointed distal processes. Each zooid bears a pair of small pedunculate avicularia attached laterally adjacent to the operculum. New autozooids are budded from a single disto-basal septulum, and paired proximo-lateral septula. Ovicells were not present.

REMARKS

Beania klugei was described from West Africa (Cook, 1968) but shown to have a tropical/sub-tropical distribution extending west to Panama, and east to the Red Sea and Zanzibar. Cook (1985) discusses the probability of its wider occurrence in the Indian Ocean. This is the first record of the species for Australia, and the West Pacific region.

Superfamily MICROPOROIDEA Gray, 1848
Family ONYCHOCELLIDAE Jullien, 1882

DIAGNOSIS

Colony encrusting. Autozooids with an extensive cryptocyst, but no gymnocyst; opesia constituting half or less of total autozoid length. Distal edge of cryptocyst notched or indented to accommodate parietal and/or opercular muscles. Avicularia vicarious, with a large mandible consisting of a thick, longitudinal sclerite and single or paired lateral laminae. No spines. Embryos brooded internally, often in dimorphic female zooids.

Smittipora Jullien, 1882

TYPE SPECIES

Vicularia abyssicola Smitt, 1873.

DIAGNOSIS

Autozoid with an extensive opesia. Avicularian mandible symmetrical, with two equally developed lateral laminae.

Smittipora cordiformis Harmer
(Fig. 6C)

Smittipora cordiformis Harmer, 1926: 260, pl. 16, figs 14-18.

DESCRIPTION

Colony an encrusting, unilaminar sheet. Autozooids hexagonal to irregularly polygonal, concave, separated by distinct sutures; 0.5-0.6 x about 0.4 mm. Frontal membrane light brown, distinct, underlain by a thick, finely granular cryptocyst; opesia longer than wide, 0.15 x 0.13 mm, situated in distal half of autozoid, its proximal edge with an angular lip. Avicularia as long as autozooids but much narrower (0.2 mm), the cryptocyst deeply concave; with an elongate oval opesia, distinctly broadened distally; distal end of avicularium narrowed and channelled for the reception of the rachis.

DISTRIBUTION

The single colony collected, at Sta. 9, marks the first record of this species from Australia. It was described by Harmer (1926) from two 'Siboga' stations in Indonesia, with additional material from Singapore, Burma and the Amirante Islands. D'Hondt (1986) recorded it from New Caledonia.

Family THALAMOPORELLIDAE
Levinsen, 1909

DIAGNOSIS

Colony encrusting or erect. Frontal membrane of autozoid entirely underlain by a granular, concave cryptocyst; opesia usually coincident with operculum; single or paired opesiules present, large. No gymnocyst. Avicularia vicarious. Ovicell large, bivalved; or absent. Vertical walls with multiporous septula. Calcareous spicules present in cavity of autozoid.

Thairopora MacGillivray, 1882

TYPE SPECIES

Membranipora dispar MacGillivray, 1869.

DIAGNOSIS

Colony encrusting, unilaminar. Frontal surface of autozooids almost entirely membranous, underlain by a complete, porous cryptocyst; opesia almost exactly coincident with operculum, with large, paired opesiules. Opesia longer than wide, oval or horseshoe-shaped, flanked by paired, hollow tubercles. Avicularia present, vicarious. Ovicells absent.

Thairopora calcarata sp. nov.
(Figs 6D-F, 7A)

MATERIAL EXAMINED

HOLOTYPE: G304962, on *Sargassum* sp.

PARATYPE: G304967, on *Sargassum* sp.

DESCRIPTION

Colonies developing irregular, unilaminar patches on *Sargassum* leaflets, adjacent lobes occasionally fusing to form short, erect, bilaminar plates. Autozooids more or less rectangular, in regular radiating rows which bifurcate at intervals; each new row commences with a vicarious avicularium. Vertical walls of autozoid form a thin, raised rim around the frontal membrane; beneath it the cryptocyst is flat to concave, and dips distally towards two large, irregularly oval, unequal-sized opesiules. Cryptocyst initially thin and smooth, with about 30 minute perforations; proximal end more distinctly nodular in later ontogeny. Opesia terminal, longer than wide, broadly oval; distal two-thirds with a smooth rim, terminating proximally, on each side, with a sharp, upturned condyle; proximal third with a broad rim of nodular, cryptocystal calcification. On each side of the operculum the

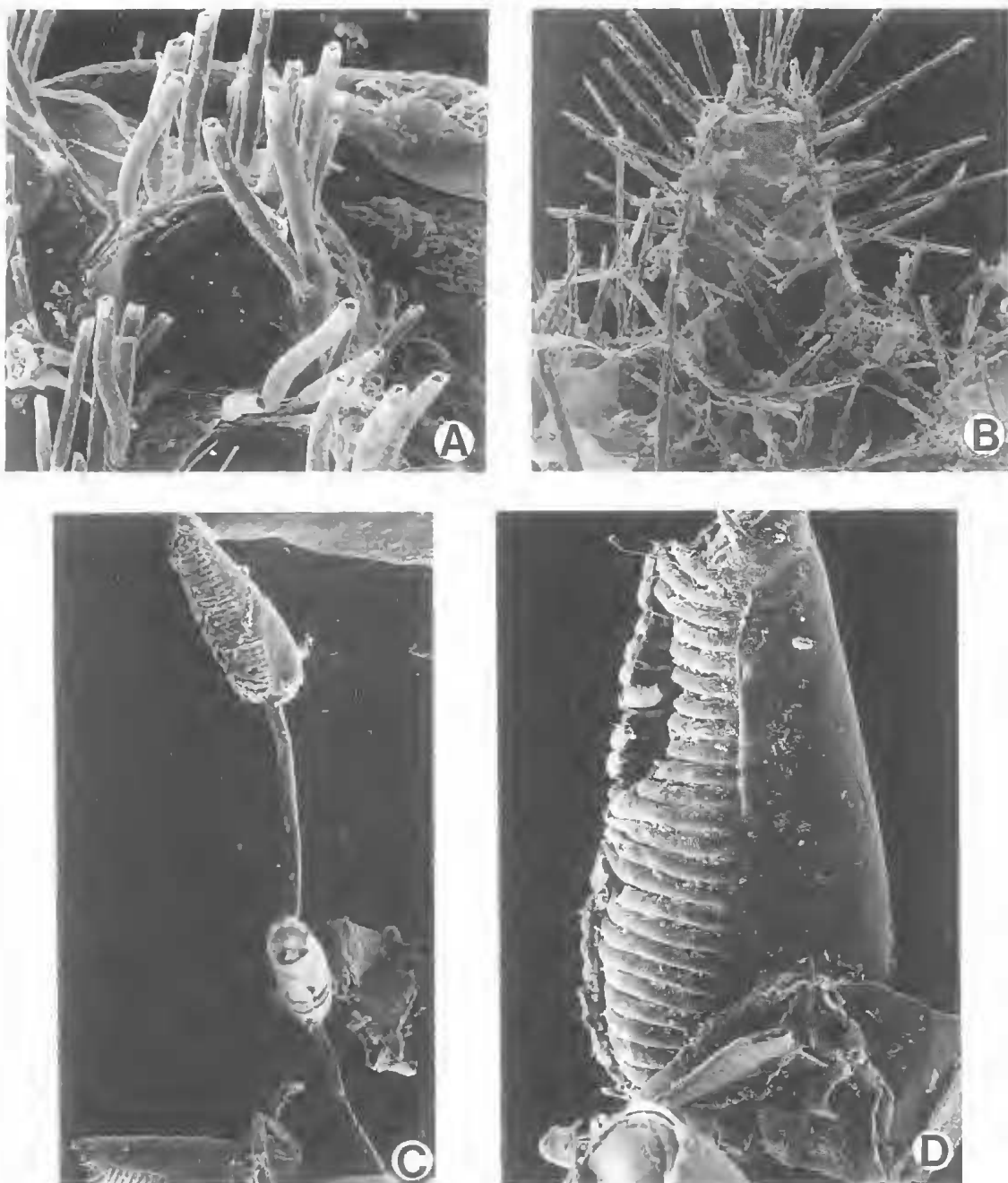


FIG. 5. A, *Chaperia* sp., x86. B, *Beania* ?*plurispinosa*, x80. C,D, *Beania pectinata*. C, part of colony, x50. D, detail of a single autozooid, x150.

smooth gymnocystal calcification constituting the distal opesia rim develops an erect tube, 0.4mm high, which expands and divides at its tip to form a branched, club-like process; these form a close lattice over the surface of the colony.

Avicularia about half as long as autozooids; rostrum smoothly calcified, in the form of a rounded, parallel-sided hood, projecting almost perpendicularly from frontal plane of zooids; proximal half with a narrow band of cryptocyst underlying the

frontal membrane; mandible elongate oval, with elongate sclerites converging at its rounded distal end. Three types of spicule present: bow-shaped compasses of two sizes (0.04mm, 0.08mm), and very long, almost straight calipers (0.19mm).

Measurements (means and standard deviations of 20 values, mm): autozoid length 0.55 ± 0.05 ; width 0.28 ± 0.03 .

REMARKS

Thairopora calcarata is distinguished from other species of the genus by the paired, branched processes flanking the zoid opesia. These interlace above the colony surface forming a regular, reticulate structure, with the meshes situated immediately above the opercula, presumably allowing lophophores to project through them. Numerous colonies were found on *Sargassum* leaflets; the epiphytic habit is characteristic of the genus.

ETYMOLOGY

Latin, *calcaris*, a spur.

Superfamily CELLARIOIDEA Fleming, 1828

Family CELLARIIDAE Fleming, 1828

DIAGNOSIS

Colony erect, branching, jointed or unjointed, attached by chitinous, tubular rhizoids. Branches cylindrical or flat-sectioned, dividing dichotomously, and/or producing lateral adventitious shoots. Autozooids in alternating, longitudinal series, in whorls around branch axis; gymnocyst absent, cryptocyst extensive, opesia coincident with operculum. Avicularia present or absent. Ovicells immersed (endotoichal).

Cellaria Ellis and Solander, 1786

TYPE SPECIES

Farcimia sinuosa Hassall, 1840.

DIAGNOSIS

Branches cylindrical, dividing dichotomously at regular intervals, and sometimes producing additional, adventitious branches. Each branch (internode) originating from a chitinous joint (node). Autozooids typically hexagonal or diamond-shaped. Opesia scarcely larger than operculum; condyles usually present within straight or convex proximal lip. Avicularia vicarious, intercalated within an autozoid row and small, or entirely replacing an autozoid. Ovicell with independent aperture distal to opesia.

Cellaria punctata (Busk) (Fig. 7D)

Salicornaria punctata Busk, 1852a: 366 (in part).

Salicornaria gracilis Busk, 1852b: 17, pl. 63, fig. 3; pl. 65 bis, fig. 2.

Cellaria punctata (Busk) Harmer, 1926: 337, pl. 21, figs 14-16; text-fig. 13a.

MATERIAL

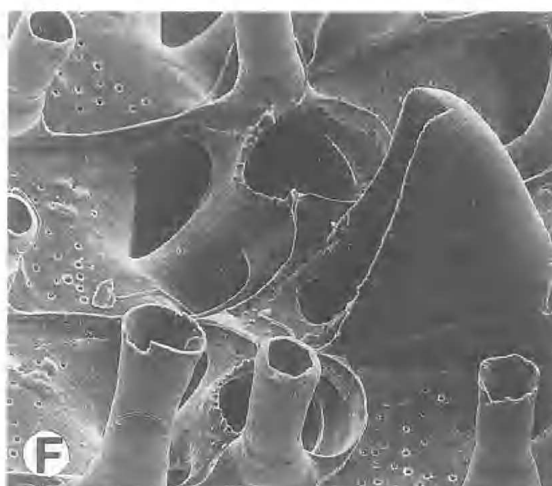
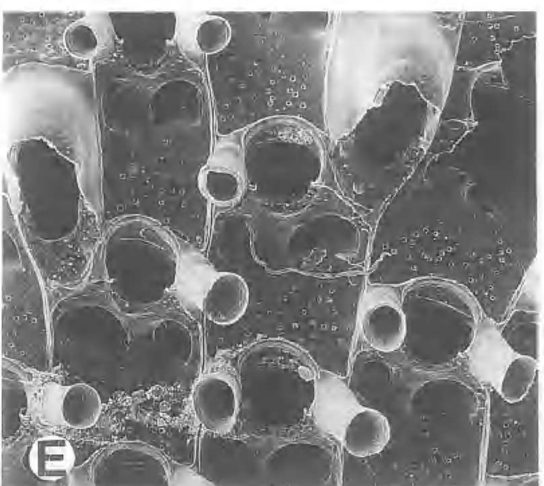
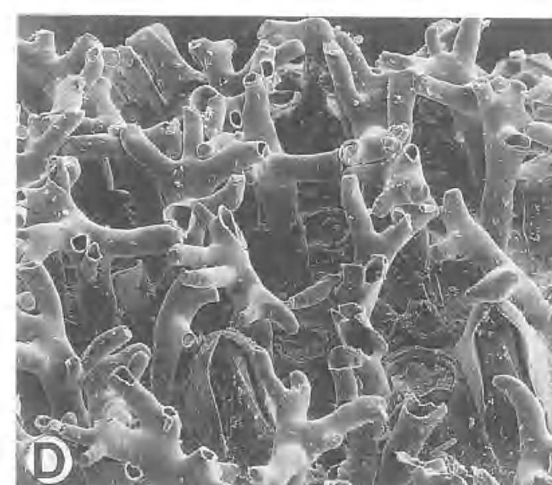
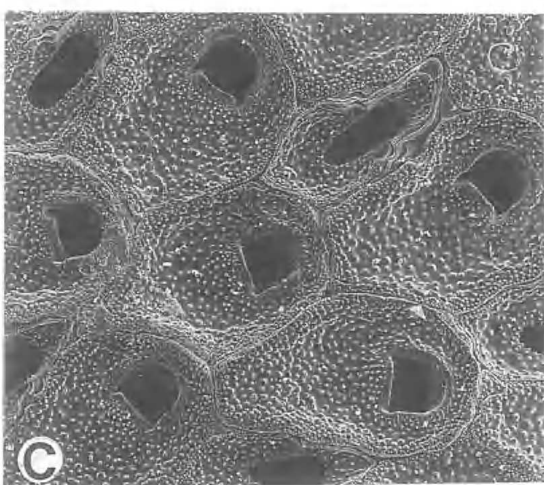
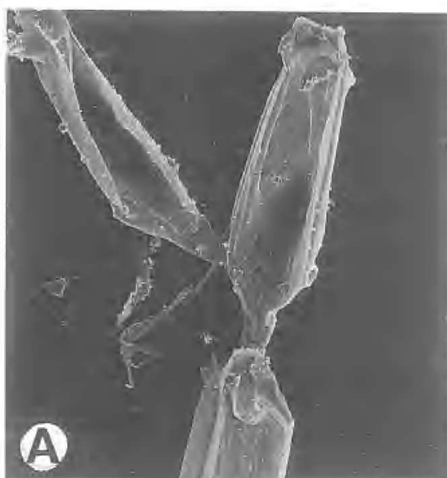
Stn. 28; one small colony attached to *Pleurotoichus clathratus*.

DESCRIPTION

Internodes slender, to 2.5mm long in the present specimen; diameter 0.25mm in non-fertile portions, 0.35mm in fertile portions. Autozooids arranged in alternating whorls of four, broadly lozenge-shaped; rounded distally, pointed proximally, borders marked by clear sutures; 0.3-0.35 x 0.2mm. Cryptocyst finely granular, deeply concave between paired, curved, longitudinal ridges which fuse with the terminal wall distal to the opesia; extending proximally almost to the proximal end of the autozoid, but not meeting. Opesia about one-sixth total autozoid length; proximal edge convex, rounded, projecting slightly; distal edge finely denticulate; a thick, rounded denticle present in each proximal corner. Fertile portions of internode swollen, with three whorls of autozooids bearing endotoichal ovicells; aperture of ovicell transversely oval, partially occluded by a rectangular plate. Avicularia sparse, as large as an autozoid; mandible semicircular; rostrum resembling a cowl, projecting from the frontal plane of the internode, proximal edge of opesia straight, with two deep notches.

REMARKS

The characteristic avicularia are well figured by Harmer (1926), who provided a synonymy for *C. punctata* (Busk). Avicularia were present in the Heron Island specimen but unfortunately were not scanned. *C. punctata* was originally described from the Queensland coast; it was reported from throughout the Indo-Malay region by Harmer (1926), whose synonymy extended its range westwards to Sri Lanka and Zanzibar, and northwards to Japan.



Superfamily HIPPOTHOOIDEA Busk, 1859
Family HIPPOTHOIDAE Busk, 1859

Hippothoa flagellum Manzoni, 1870

MATERIAL
Stn. B24.

REMARKS

This inconspicuous, creeping bryozoan favours biogenic carbonates as a substratum. Described originally as a Pliocene fossil from Italy, it seems to be one of the few genuinely cosmopolitan species of Bryozoa, occurring even in Arctic and Antarctic seas. The Heron Island colonies showed no significant difference from European, or indeed Antarctic, specimens.

Trypostega Levinsen, 1909

TYPE SPECIES

Lepralia venusta Norman, 1864.

DIAGNOSIS

Colony encrusting, unilaminar. Autozooids with regularly perforated frontal shield; primary orifice deeply sinuate, with prominent condyles, appearing cleithridiate. Operculate heterozooids (zoeciules) interspersed with autozooids. Ovicell hyperstomial, prominent, regularly perforated, closed by autozooid operculum. Basal pore chambers present.

Trypostega venusta (Norman)
(Fig. 7B,C)

Lepralia venusta Norman, 1864: 84, pl. 10, figs 2,3.
Trypostega venusta (Norman) Harmer, 1957: 953.

MATERIAL
Stn. B23.

REMARKS

Trypostega venusta is widely distributed in warm temperate to tropical seas and has been recorded from all of the oceans. It forms thin, rather inconspicuous sheets on biogenic carbonates.

Superfamily ARACHNOPUSIOIDEA
Jullien, 1888

Family EXECHONELLIDAE Harmer, 1957

Exechonella Duvergier, 1924

TYPE SPECIES

Cyclicopora? grandis Duvergier, 1921.

DIAGNOSIS

Colony encrusting. Autozooid frontal shield formed by the fusion of centripetally developing calcareous processes, with thickly rimmed or tubaeform foramina remaining between. A tall, imperforate peristome develops around the orifice. Avicularia, ovicells and spines absent. Multiporous septula present in vertical walls.

Exechonella ampullacea sp. nov.
(Fig. 7E)

MATERIAL EXAMINED

HOLOTYPE: Stn. B27: QMG304975.
PARATYPE: Stn. B27: QMG304977.

DESCRIPTION

Colony encrusting, unilaminar; developing a small, coherent patch, or dividing into short series of two or three autozooid rows. Autozooids oval, convex, separated by deep grooves, with a tall, cylindrical, terminal peristome imparting overall a bottle shape; 0.7-0.9 x 0.45-0.55mm. Frontal shield with 30-40 round foramina, each with a thick, raised, more or less circular rim; peristome finely nodular, imperforate, cylindrical, with a slightly flared rim, up to 0.3mm long when undamaged. Primary orifice transversely oval, without conspicuous condyles. No avicularia present.

REMARKS

This species differs from other described species of *Exechonella* in the small size of its autozooids and in the proportionately smaller, more densely distributed foramina. It most resembles *E. tuberculata* (MacGillivray) but lacks the spinous frontal processes described in that species by Harmer (1957), and is very much smaller, with smaller frontal foramina, than the specimen illustrated by Gordon (1989a; pl.23, fig.D).

FIG. 6. A,B, *Beania klugei*. A, part of colony, x50. B, distal end of an autozooid, with avicularia, x240. C, *Smittipora cordiformis*, x45. D-F, *Thairopora calcarata*. D, edge of colony, with spines in place, x45. E, cleaned portion of colony, with two avicularia, x55. F, an avicularium in lateral view, x95.

ETYMOLOGY

Latin, *ampullaceus*, flask-like.

Superfamily LEPRALIELLOIDEA

Vigneaux, 1949

REMARKS

Gordon (1993a) published the justification for the unfortunate necessity of using this taxon for the now familiar Umbonuloidea Canu, 1904.

Family EXOCHELLIDAE Bassler, 1935

Escharoides Milne Edwards, 1836

TYPE SPECIES

Cellepora coccinea Abildgaard, 1806.

DIAGNOSIS

Colony encrusting. Autozooids with an umbonuloid frontal shield bordered by large marginal pores. Orifice with a prominent, distal, subapertural plate; bordered proximally by a thickened peristome bearing denticles on its inner face. Oral spines present. Avicularia adventitious, typically lateral to orifice. Ovicell prominent, hyperstomial, imperforate. Basal pore chambers present.

Escharoides longirostris Dumont

(Fig. 8A)

Escharoides longirostris Dumont, 1981: 630, fig. 1A.
Escharoides longirostris, Dumont, Hayward, 1988: 293.

MATERIAL EXAMINED

Sins. 14, 15.

DESCRIPTION

Colony a small, inconspicuous patch. Autozooids broadly hexagonal, convex, separated by deep grooves; 0.45 x 0.40mm. Frontal calcification smooth, with scattered, round nodules; marginal pores large, round and distinct. Orifice with a low peristome proximally, developed medially as a prominent, rounded mucro bearing on its inner face an angular denticle; paired proximo-lateral denticles also present on the inner face. Six slender, distal oral spines present, bordering a broad, smooth oral plate. Avicularia single or paired, lateral to orifice, laterally directed; rostrum slender, tapered, 0.2mm long, hooked distally. Ovicell inconspicuous, recumbent on distally succeeding autozooid and partially im-

mersed; its aperture is marked by an angular lip extending between the bases of the distalmost spine pair.

REMARKS

This species was described from the Sudanese Red Sea coast by Dumont (1981) and subsequently (Hayward, 1988) recorded from Mauritanian reefs. Its colonies are always small, rarely exceeding 2-3mm², and seem restricted to cryptic habitats among coral rubble. This is the first occurrence of the species in Australian waters.

Family LEPRALIELLIDAE Vigneaux, 1949

REMARKS

Gordon (1993a) has demonstrated that *Celleporaria* Lamouroux, 1821 and *Lepraliella* Levinsen, 1917 should be accommodated in the single family Lepraliellidae, which has taxonomic priority over Celleporariidae Harmer, 1957.

Celleporaria columnaris (Busk)

(Fig. 8B-D)

Cellepora columnaris Busk, 1881: 343, 348, pl. 26, fig. 4; Busk, 1884: 194, pl. 29, fig. 11; pl. 35, fig. 16.

Holoporella intermedia (Busk) Hastings, 1932: 446, text-fig. 20

Celleporaria columnaris (Busk) Harmer, 1957: 677, pl. 42, figs 18-21, 23; Gordon, 1993a: 335, fig. 15a-d.

MATERIAL EXAMINED

Sins. 16, 25.

DESCRIPTION

Colony a small, multilaminar patch. Autozooids oval, convex, 0.4-0.5 x 0.3-0.35mm, with finely nodular calcification; frontal marginal pores few in number, widely spaced. Primary orifice wider than long, commonly 0.1 x 0.14mm; proximal edge almost straight; condyles rounded, conspicuous, no oral spines, no peristome. Suboral avicularium medially situated, perpendicular to orifice plane; rostrum facing laterally, 0.05mm long, the distal end rounded and coarsely toothed; frequently, the cystid is developed as a stout, spike-like umbo, apparently calcifying in later ontogeny and obliterating the rostrum, which varies little in size. Vicarious avicularia infrequent, smaller than autozooids; rostrum about 0.2mm long, slender, almost parallel-sided, its distal end deeply cupped, with a coarsely toothed rim.

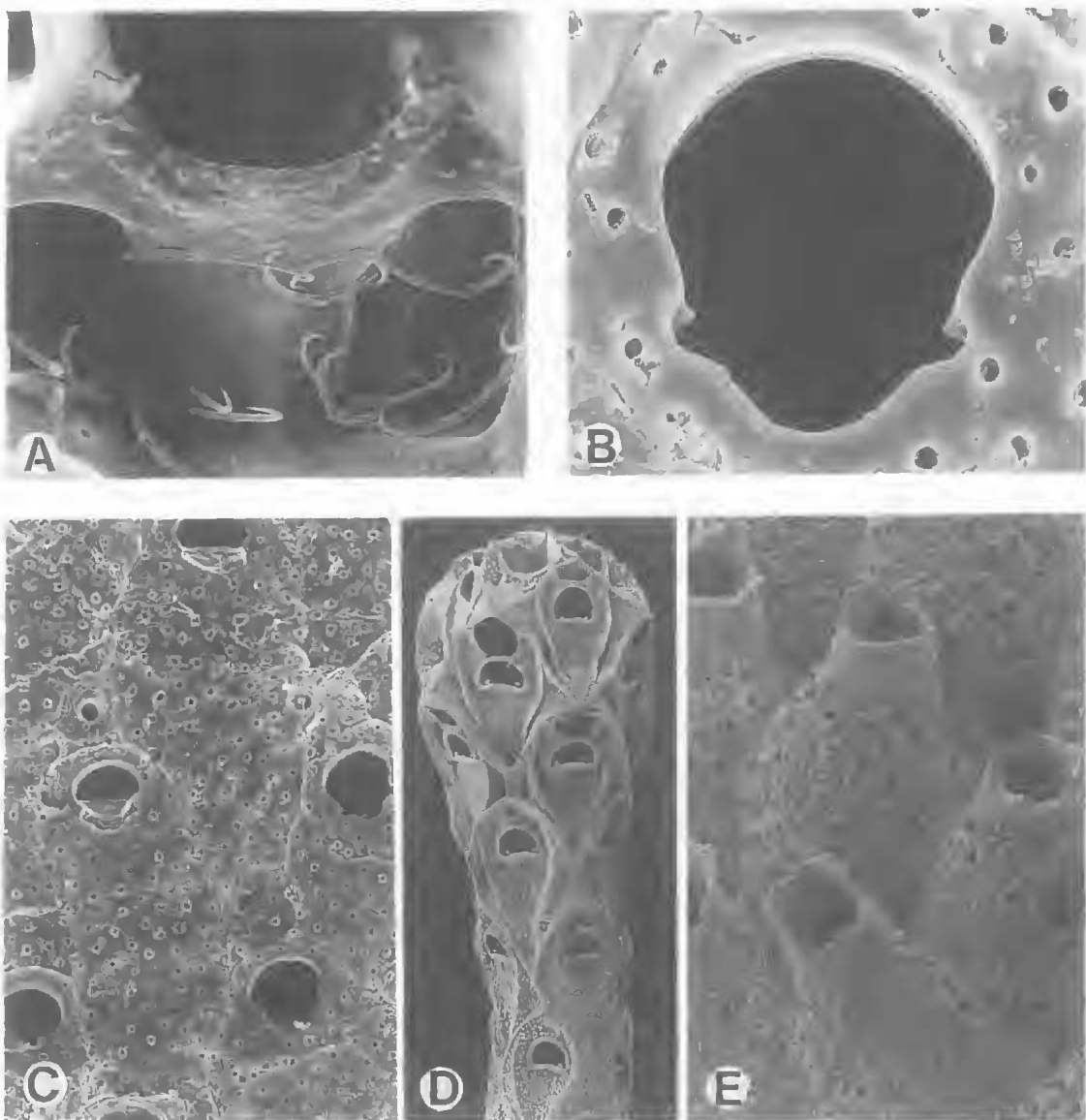


FIG. 7. A, *Thaiopora calcarata*, detail to show spicules, x260. B,C, *Trypostega venusta*. B, primary orifice, x450. C, group of autozooids, x90. D, *Cellaria punctata*, x60. E, *Exechonella ampullacea*, x55.

Ovicell slightly wider than long, prominent, with coarsely nodular calcification.

REMARKS

This small species is readily distinguished by its conspicuous condyles and its lack of a peristome. Although the cystid of the suboral avicularium varies in size, often being developed as a prominent columnar umbo, the rostrum is essentially monomorphic and shows little variation in size. *C. columnaris* was originally described from

the Bass Strait (Busk, 1881); Harmer (1957) described material from Indonesia, and his synonymy implied a wide geographical distribution, to Ceylon, the Seychelles and Zanzibar, and northwards to Japan. However, as with all species in this difficult genus, the synonymy of *C. columnaris* needs to be reviewed following re-examination of the specimens on which it is founded. Hasting's (1932) specimens of "*Holoporella intermedia*" from the GBR are referable to *C. columnaris*, and the micrographs of *C. columnaris*

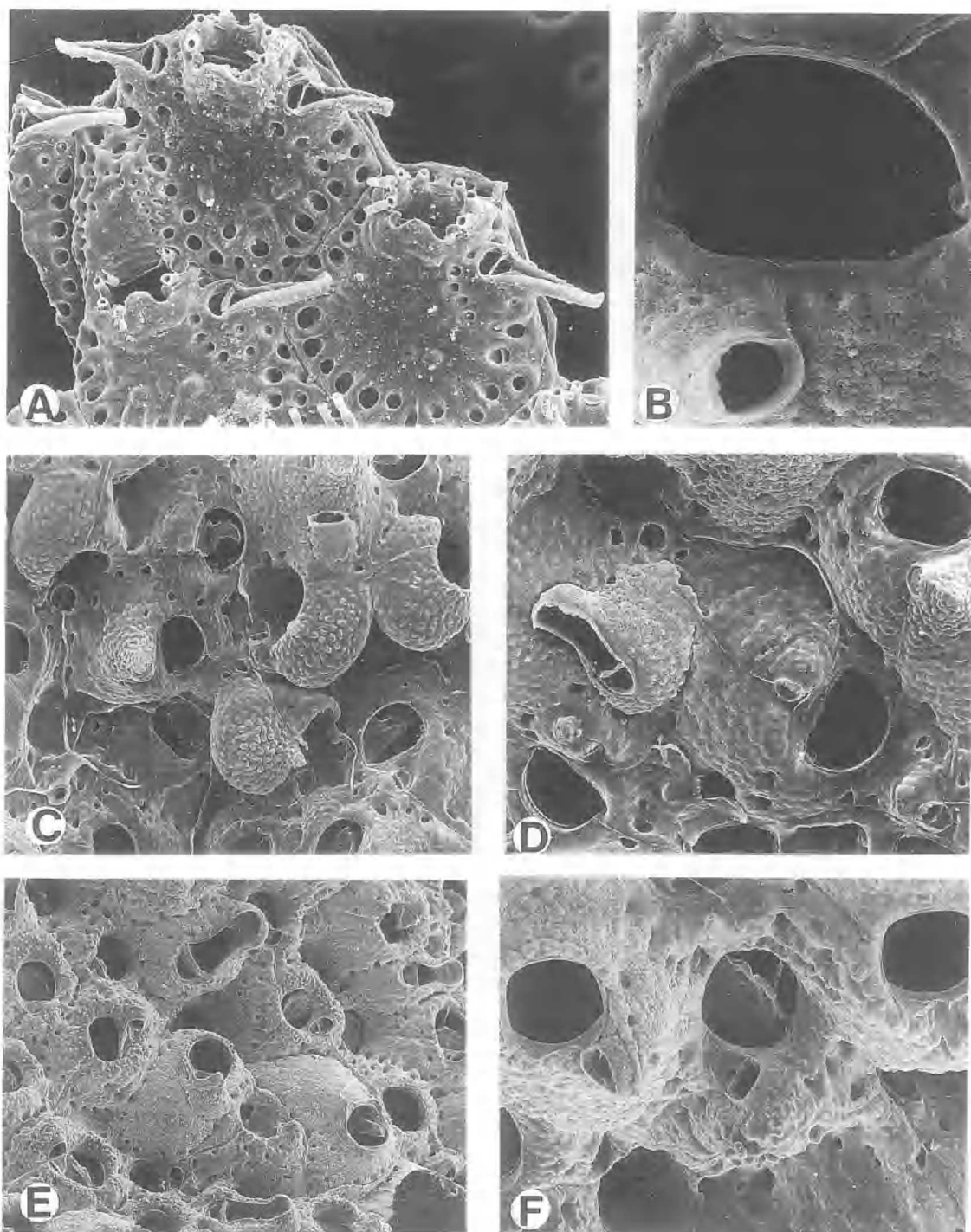


FIG. 8. A, *Escharoides longirostris*, x85. B-D, *Celleporaria columnaris*. B, primary orifice, x340. C, ovicelled autozooids, x60. D, autozooids and an enlarged avicularium, x100. E, F, *Celleporaria granulosa*. E, portion of colony, with enlarged avicularium, x22. F, detail of three autozooids, showing primary orifice, x50.

from New Caledonia published by Gordon (1993b) show the same species as that described and figured here.

***Celleporaria granulosa* (Haswell)
(Fig. 8E,F)**

Cellepora granulosa Haswell, 1881: 40.

Celleporaria granulosa (Haswell) Harmer, 1957: 688, pl. 43, figs 14-19.

MATERIAL EXAMINED
Stn. B27.

DESCRIPTION

Colony multilaminar, nodular. Autozooids large, convex, with distinct boundaries marked by sharp sutures; 1.0-1.1 x 0.8-0.9 mm. Primary orifice slightly wider than long, 0.25 x 0.3 mm; proximal border shallowly concave, no condyles, no oral spines. Peristomial rim low and thickened. Suboral avicularium medially situated, perpendicular to plane of orifice, facing laterally; rostrum oval, distally rounded, with a smooth rim. Vicarious avicularia as large as autozooids, rostrum 0.8 mm long, broadest across the thickened crossbar, spatulate and deeply cupped distally. Ovicell prominent, spherical. Frontal calcification thick, nodular; with a single series of closely spaced, small, marginal pores, which become increasingly accentuated as calcification thickens.

REMARKS

This distinctive species is recognized by the large size of its autozooids, and the correspondingly large primary orifice, and by its thick, coarsely nodular calcification. The Heron Island specimens have been compared with the paratype specimens described by Harmer (1957) and conserved in the Natural History Museum, London (BMNH reg.nos. 1883.11.29.50, 1910.6.16.6), and there is no question that the two are identical. *C. granulosa* was described from the Queensland coast, and certainly occurs in the Torres Straits. Thornely's specimens of "*Holoporella simplex*" from Cargados Shoal, Indian Ocean, were referred to *C. granulosa* by Harmer, but should now be re-examined before the implied geographical distribution can be accepted.

***Celleporaria hesperopacifica* sp.nov.
(Fig. 9A,B)**

Celleporaria mamillata Gordon, 1993b: 338, fig. 16c.

MATERIAL EXAMINED

HOLOTYPE: QMG304974, on *Sargassum* sp.

PARATYPE: QMG304970, on *Sargassum* sp.

DESCRIPTION

Colony an encrusting, multilaminar sheet; thickening and becoming distinctly mamillate with increasing size. Autozooids tumid, convex, smoothly calcified, with few, indistinct, marginal pores; boundaries distinct at the growing edge, elsewhere only newly budded autozooids clear. Primary orifice orbicular, the proximal border deeply concave between small, rounded condyles. Two long, widely spaced, distal oral spines present in earliest ontogeny only. Peristome well developed, deep and thick, incorporating a vertically-orientated, median suboral avicularium, of widely varying size, the cystid produced apically as a tapered, round-sectioned umbo. Adjacent to the orifice the peristome rim is deeply notched; with ontogenetic thickening the inner edges of this notch close slightly, to define a narrow channel. The avicularium may be very small, <0.05 mm, with a spine-like mucro; or much larger, to about 0.2 mm, with a thick, columnar mucro, with basal diameter about 0.1 mm. In all cases the rostrum is oval, rounded and slightly hooded distally, with fine denticulations on the distal rim. Similar avicularia, equally variable in length, occur on the interstices between autozooids. Ovicell hemispherical, smoothly calcified, except for occasional short spines on the rim above the aperture. In some autozooids a second, slender, spine-like mucro develops on the lateral peristome rim.

REMARKS

This species is most similar to *C. fusca* (Busk) (see Ryland & Hayward, 1992) but differs in its orbicular primary orifice, with deeply concave proximal rim, in its smooth calcification, and in the range of avicularia present. The large vicarious avicularia of *C. hesperopacifica* have a broad, scaphoid, or asymmetrically tapered rostrum, and the crossbar is slender, lacking a columella. Those of *C. fusca* tend to have narrow spatulate rostra and the crossbar bears a stout columella. The suboral avicularia of *C. fusca* show a wider range of size than those of *C. hesperopacifica*, and in the largest the rostral rim is deeply and coarsely corrugate.

ETYMOLOGY

Latin, *hesperus*, west; *pacificus*, referring to the ocean.

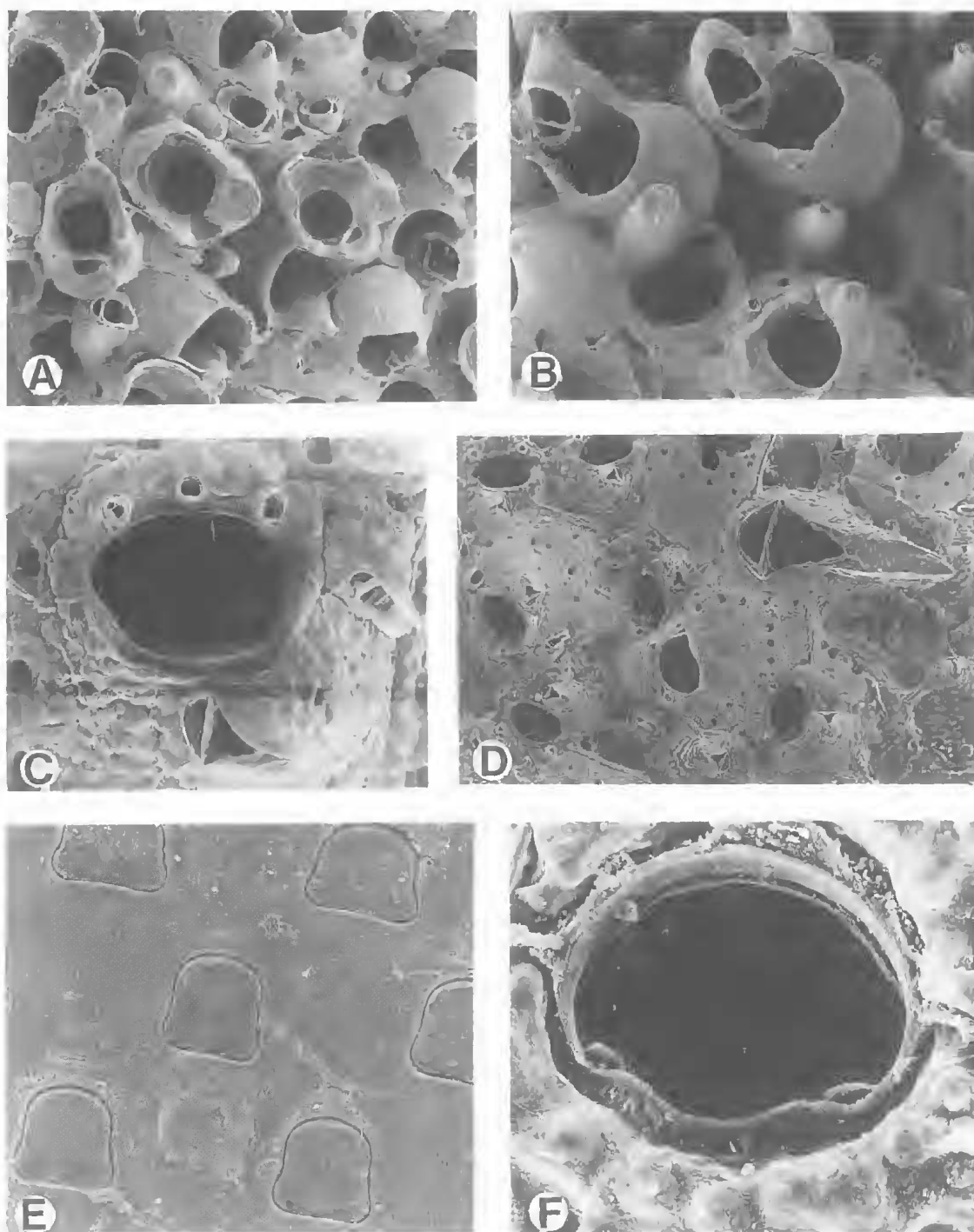


FIG. 9. A,B, *Celleporaria hesperopacifica*. A, group of autozooids and a variety of avicularia, with the broken bases of columnar processes, x130. B, detail showing ovicells, avicularia and columnar processes, x75. C,D, *Celleporaria sicaria*. C, primary orifice, spine bases and characteristic avicularia, x130. D, portion of colony with enlarged avicularium, x40. E, *Pleurotoichus clathratus*, x70. F, *Calyptotheca rupicola*, primary orifice, x250.

Celleporaria sicaria sp. nov.
(Fig. 9C,D)

MATERIAL EXAMINED

HOLOTYPE: QMG304965, Stn. 25.

DESCRIPTION

Colony encrusting, multilaminar. Autozooids broadly oval, convex, separated by distinct sutures; 0.6-1.0 x 0.4-0.6 mm. Frontal shield calcification finely nodular, with a single series of indistinct marginal pores, and a more conspicuous series of larger pores traversing the shield just proximal to the suboral avicularium. Primary orifice wider than long, 0.12 x 0.22 mm, with straight proximal edge; two to four slender, distal oral spines present, peristome developed as a low, projecting lip along proximal edge of orifice. Suboral avicularium medially situated, with substantial cystid; rostrum 0.15-0.2 mm, elongate triangular, acute to frontal plane, facing laterally. Vicarious avicularia as large as autozooids, with dagger-like rostrum, 0.5-0.7 mm long, pointed distally and with a coarsely toothed rim. Numerous small adventitious avicularia present, developed along one or both of the autozooid frontal pore series; mostly smaller than the suboral avicularium, with elongate oval rostrum. Ovicells not present.

REMARKS

A single colony 1 cm² was collected from Stn. 25. The distinctive orifice and suboral avicularium, and striking vicarious avicularium, together distinguish this species from all others presently assigned to *Celleporaria*.

ETYMOLOGY

Latin, *sica*, a dagger.

Superfamily EUTHYRISELLOIDEA

Bassler, 1935

Family EUTHYRISELLIDAE Bassler, 1935

DIAGNOSIS

Colony encrusting; or erect, flexible and rooted. Autozooids with interior cryptocystidean calcification, bounded by an extrazoooidal, colony-wide, cuticle, above hypostegal and extrazoooidal coelomic space. Avicularia present or absent. Embryos brooded in ovicells or dimorphic female zooids.

Pleurotoichus Levinsen, 1909

TYPE SPECIES

Euthyris clathrata Harmer, 1902.

DIAGNOSIS

Colony erect, flustriform; with broad, branching, unilaminar fronds. Autozooids with cryptocystidean frontal shields consisting of irregular, cuticle-bounded bars of calcite; bounded frontally with exterior cuticular wall, above a hypostegal coelom. Common extrazoooidal coelomic space along the margins of the frond, and over the entire basal surface. Multiporous septula present between autozooids. Embryos brooded in dimorphic female zooids with enlarged orifices.

Pleurotoichus clathratus (Harmer)
(Fig. 9E)

Euthyris clathrata Harmer, 1902: 266, pl. 16, figs 18-31.

Pleurotoichus clathratus (Harmer) Levinsen, 1909: 270; Cook and Chimonides, 1981: 63, figs 8, 34.

MATERIAL EXAMINED

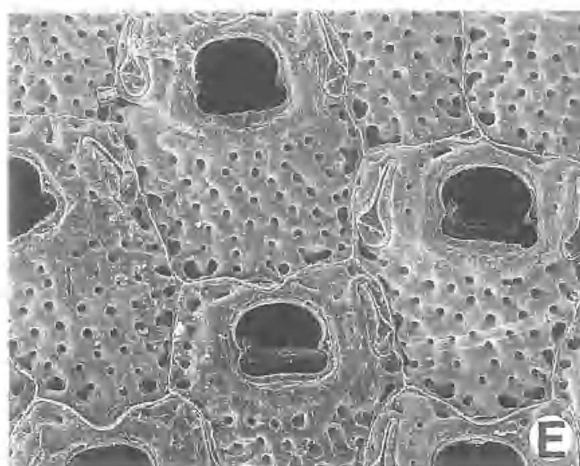
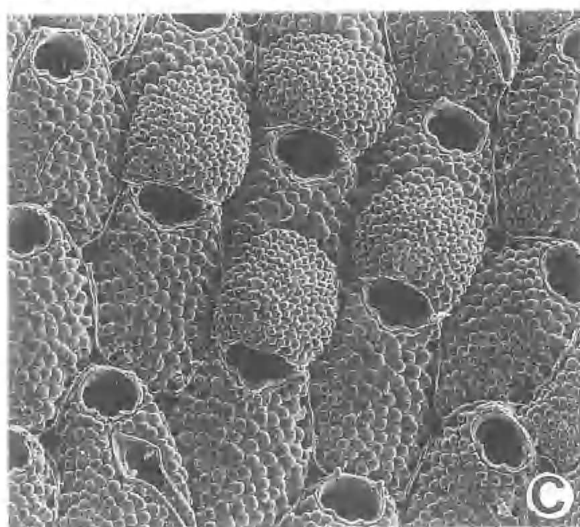
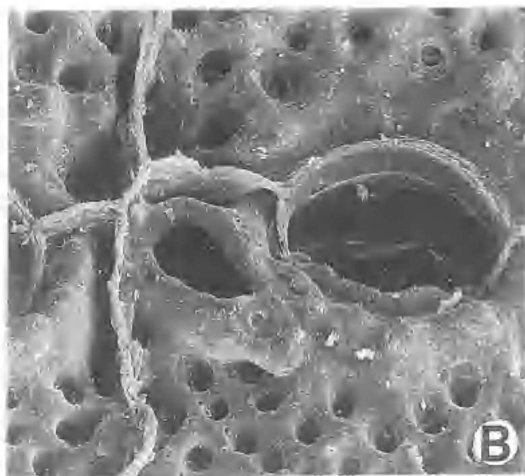
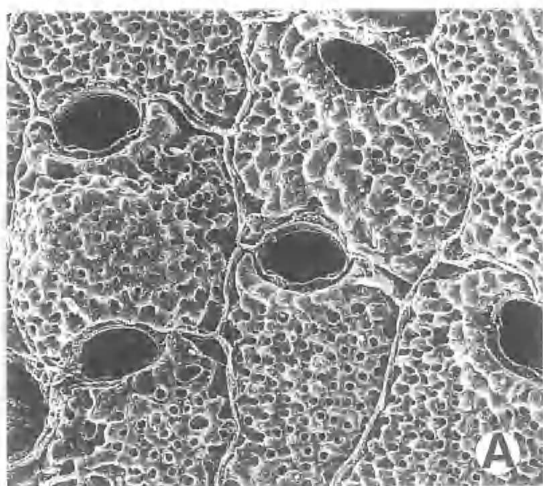
Numerous colonies attached to dead shell and coralline algae, Stn. 28.

DESCRIPTION

Colony erect, flustrine, unilaminar; horny and flexible, present specimens to 110 mm high. Branches concavo-convex, almost parallel-sided, but broadening slightly towards distal ends; dividing dichotomously at irregular intervals, but also developing adventitious branches at different levels of the colony; commonly 2-3 mm wide in youngest colonies, but up to 8 mm in oldest, basal parts of large colonies. Autozooids arranged in regular, alternating longitudinal series, 0.8-0.9 x 0.35 mm, with a large, bell-shaped aperture comprising one-third total length. Frontal shield cuticular, underlain by few, irregular calcified skeletal elements, also bounded by thick cuticle. No spines or avicularia; ovicells brooded in dimorphic autozooids.

REMARKS

The colonies are strong and flexible, presumably adapted to withstand considerable water flow and turbulence. They are richly overgrown with epizotes, including numerous hydroids and bryozoans. *Pleurotoichus clathratus* is widely distributed in the Indo-West Pacific region; it has been reported from the coasts of South Australia,



New South Wales and Queensland, and a specimen from Heron Island was described by Cook & Chimonides (1981).

Superfamily SCHIZOPORELLOIDEA

Jullien, 1883

Family PARMULARIIDAE Canu & Bassler,
1927

Calypthotheca rupicola sp. nov.
(Figs 9F, 10A,B)

TYPE MATERIAL

HOLOTYPE: QMG304959, Stn. 7

PARATYPE: QMG304966, Stn. B21

DESCRIPTION

Colony a spreading, unilaminar sheet. Autozooids rectangular to irregularly polygonal, flat, separated by thick, raised sutures. Primary orifice broader than long; proximal border shallowly concave between short, rounded condyles. Frontal shield densely perforated, the perforations interspaced with smooth, rounded tubercles, which thicken in later ontogeny. A curved band of especially large tubercles extends around the proximal and lateral borders of the orifice, constituting a distinct peristomial rim. Avicularia rather rare; when present, proximo-lateral to orifice, on a slightly inflated cystid; rostrum 0.2 mm long, bluntly triangular, directed medially. Ovicell recumbent on distally succeeding autozooid, not crossed by sutures; slightly broader than long, distinctly flattened; perforation and tuberculation uniform with frontal shield.

Measurements (means and standard deviations of 20 values, mm): autozooid length 0.65 ± 0.06 ; width 0.41 ± 0.06 ; orifice length 0.13 ± 0.007 ; width 0.19 ± 0.007 .

REMARKS

The shape of the primary orifice, and the orientation of the adventitious avicularium in relation to it, together distinguish this species from other described species of *Calypthotheca*.

ETYMOLOGY

Latin, *rupes*, rock.

Family CHEILOPORINIDAE Bassler, 1936

Cheiloporina campanula sp. nov.
(Fig. 10E,F)

MATERIAL EXAMINED

HOLOTYPE: QMG304978, Stn. 25.

PARATYPE: QMG304972, Stn. 25.

DESCRIPTION

Colony encrusting, forming a thick, spreading, unilaminar sheet. Autozooids broadly hexagonal, convex, separated by distinct sutures. Frontal shield thick, coarsely nodular, closely and densely perforated by small round pores, the marginal series larger and more irregular than the rest; cuticle clearly visible above the calcified shield, pinkish brown in dried material. Primary orifice distinctly wider than long, proximal margin appearing straight but actually slightly up-curved in the frontal plane; prominent, rounded, downcurved condyles impart a bell-like outline to the orifice. Avicularia lateral to orifice, single or paired, missing in some autozooids; oval proximally, the rostrum abruptly narrowed distal to the crossbar, accommodating a slender, needle-like mandible; size variable, commonly 0.3 mm long, but as small as 0.1 mm, directed distally or medio-distally. Fertile autozooids not observed.

Measurements (means and standard deviations of 20 values, mm): autozooid length 1.02 ± 0.10 ; width 0.70 ± 0.11 ; orifice length 0.24 ± 0.002 ; width 0.30 ± 0.001 ; avicularium length 0.32 ± 0.005 .

REMARKS

In species of *Cheiloporina* the ovicell is reduced and immersed, and brooding autozooids are characterized by dimorphic orifices, which are shorter than those of non-reproductive autozooids and typically trilobed. In *C. campanula* all autozooids have a slightly trilobed orifice with a distinct bell-shaped outline. No dimorphic orifices could be discerned, and the morphology of brooding autozooids remains unknown.

ETYMOLOGY

Latin, *campanula*, a bell.

FIG. 10. A,B, *Calypthotheca rupicola*. A, autozooids and an ovicell, x50. B, distal end of an autozooid, with an avicularium, x150. C,D, *Robertsonidra praecipua*. C, portion of colony, with ovicells and avicularia, x40. D, detail of a single autozooid, with avicularium, x150. E,F, *Cheiloporina campanula*. E, group of autozooids, x55. F, detail of a single autozooid, with avicularium, x70.

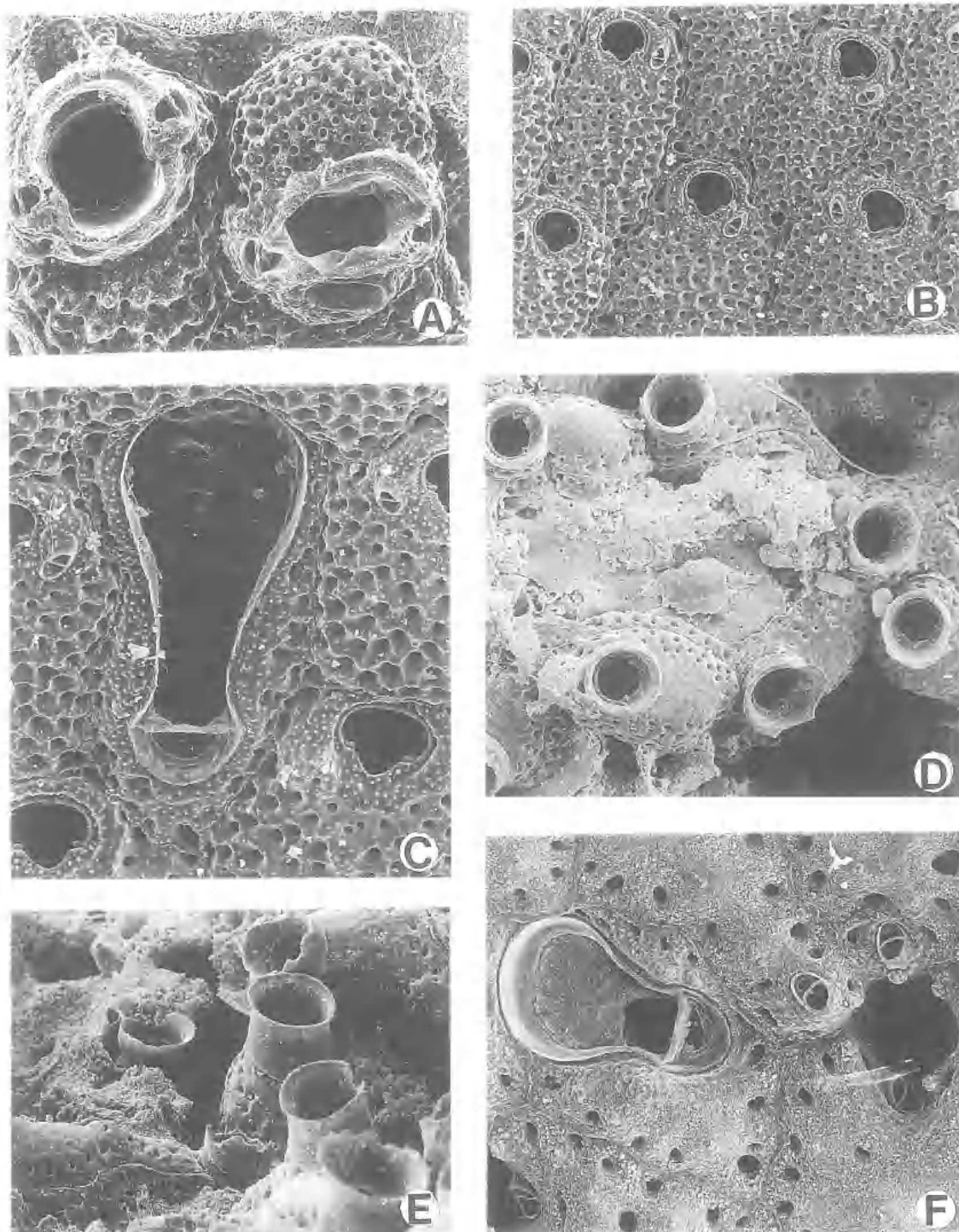


FIG. 11. A, *Gigantopora pupa*, x50. B,C, *Stylopoma herodias*. B, Group of autozooids, x60. C, a vicarious avicularium, x100. D,E, *Nimba saxatilis*. D, group of autozooids, x40. E, autozooids in lateral view, to show peristomes, x45. F, *Cigclisula fruticosa*, x85.

Family GIGANTOPORIDAE Bassler, 1935

Colony encrusting or erect. Autozooids with regularly perforated frontal shield. Primary orifice broadly concave proximally, below prominent lateral condyles. Avicularia adventitious, lateral to orifice, paired; extending medially across the frontal rim of the peristome, above a large, lower foramen. Ovicells hyperstomial or immersed.

Gigantopora Ridley, 1881

TYPE SPECIES

Gigantopora lyncooides Ridley, 1881.

DIAGNOSIS

Colony encrusting; or erect, foliaceous or viculariiform. Frontal shield nodular, closely perforated. Ovicells hyperstomial, nodular, densely perforated. Uniporous septula present in vertical walls.

Gigantopora pupa (Jullien)
(Fig. 11A)

Galeopsis pupa Jullien, in Jullien and Calvet, 1903: 95, pl. 12, fig. 1.

Gigantopora pupa (Jullien) Harmer, 1957: 880, pl. 60, figs 3,9; Gordon, 1984: 79, pl. 26, fig. F

MATERIAL EXAMINED

Stn 14, a single colony.

REMARKS

This distinctive species was described originally from the Tuamotu Archipelago. It has been recorded since from the Philippine Islands and the Torres Straits (Harmer, 1957) and from the Kermadec Ridge (Gordon, 1984). This is its first occurrence from the GBR.

Family SCHIZOPORELLIDAE Jullien, 1883

Robertsonidra praecipua sp.nov.
(Fig. 10C,D)

TYPE MATERIAL

HOLOTYPE: QMG304955, Stn. 5.

DESCRIPTION

Colony an encrusting, unilaminar sheet. Autozooids oval to hexagonal, convex, separated by distinct sutures. Primary orifice wider than long; with a short, U-shaped sinus occupying about

one-half its proximal width, flanked by short, sharply pointed condyles. Two delicate evanescent spines on distal border, persisting in ovicelled autozooids. Frontal shield with glistening, smoothly nodular calcification typical of the genus, bordered by a single series of large, round, marginal pores. An adventitious avicularium present on a minority (<10%) of autozooids, lateral suboral in position, directed proximo-laterally; opesia triangular, rostrum strongly tapered to a rounded distal tip; crossbar slender, complete. Ovicell recumbent on distally succeeding autozooid, about as wide as long, globular; calcification more finely nodular than that of frontal shield.

Measurements (means and standard deviations of 20 values, mm): autozooid length 0.65 ± 0.05 ; width 0.43 ± 0.04 ; orifice length 0.14 ± 0.006 ; width 0.18 ± 0.009 ; avicularium length 0.37 ± 0.04 .

REMARKS

This species is very similar to *R. novella* Ryland & Hayward 1992, a colony of which was growing adjacent to the unique holotype of *R. praecipua*. Apart from an obvious difference in size, the autozooids also differ in the size and shape of the primary orifice, which in *R. novella* is almost as long as wide (*R. novella*: autozooid length 0.54 ± 0.06 ; width 0.38 ± 0.03 ; orifice length 0.13 ± 0.002 ; width 0.14 ± 0.003 ; avicularium length 0.23 ± 0.04). *R. praecipua* lacks the suboral umbo seen in *R. novella* and also the disto-laterally directed, lateral suboral avicularium characteristic of that species. The enlarged, proximo-laterally directed avicularium which occurs in some autozooids of *R. novella* is very much smaller than that of *R. praecipua*.

ETYMOLOGY

Latin, *praecipuus*, extraordinary.

Stylopoma herodias sp.nov.
(Fig. 11B,C)

MATERIAL EXAMINED

HOLOTYPE: QMG304953, Stn. B24

PARATYPE: QMG304954, Stn. B24.

DESCRIPTION

Colony an extensive, multilaminar, encrusting sheet. Autozooids hexagonal to irregularly polygonal, flat or slightly convex, separated by distinct sutures. Primary orifice wider than long; sinus deep, U-shaped, occupying almost whole of proximal border, and constituting one-third of

total orifice length; condyles small and rounded, inconspicuous. No oral spines; peristome developed as a low ridge of finely granular calcification around distal and lateral borders of orifice. A single, lateral oral, adventitious avicularium present; rostrum bluntly triangular, slightly acute to frontal plane, directed disto-laterally. Frontal shield evenly and densely perforated by large round pores, each surrounded by a rim of thickened calcification. Vicarious avicularia sporadic, larger than autozooids, with gigantic spatulate rostrum; lacking a palate, but with a complete, slender crossbar. Ovicells not observed.

Measurements (means and standard deviations of 20 values, mm): autozooid length 0.57 ± 0.08 ; width 0.34 ± 0.03 ; orifice length 0.10 ± 0.005 ; width 0.12 ± 0.005 .

REMARKS

This species is most similar to *S. thornelyae* Livingstone, but differs in its smaller orifice and proportionately larger, more broadly U-shaped, sinus. In *S. thornelyae* the sinus occupies less than half the total width of the orifice and is flanked by rather prominent knobbed condyles. Enlarged spatulate avicularia occur in *S. thornelyae*, but are adventitious, each developing on the frontal shield of an autozooid.

ETYMOLOGY

Greek, *herodias*, a heron.

Nimba Jullien in Jullien & Calvet, 1903

TYPE SPECIES

Nimba praetexta Jullien in Jullien & Calvet, 1903.

DIAGNOSIS

Colony encrusting, uniserial. Autozooid frontal shield with marginal pores. Orifice sinuate, enclosed by a tall peristome. Adventitious avicularia present, or absent. Ovicell hyperstomial, not closed by autozooid operculum.

Nimba saxatilis sp. nov.
(Fig. 11D,E)

MATERIAL EXAMINED

HOLOTYPE: QMG304951.

DESCRIPTION

Colony encrusting, the autozooids in creeping, uniserial chains, branching at irregular intervals. Autozooids elongate, oval to distinctly club-

shaped, broadest at the distal end. Primary orifice about as wide as long, proximal edge broadly concave, condyles small and knob-like. Peristome well developed, forming an erect tube completely encircling orifice, its rim thin and evenly flared. Frontal shield convex, thick, nodular; bordered by a single or double series of small marginal pores, separated by a well marked groove from the vertical walls. No spines or avicularia. Ovicells not found.

Measurements (means and standard deviations of 20 values, mm): autozooid length 0.63 ± 0.07 ; width 0.37 ± 0.03 ; orifice length 0.13 ± 0.006 ; width 0.14 ± 0.008 .

REMARKS

Despite the moderately large size of its autozooids, colonies of this species were especially inconspicuous among the epifauna of coral rubble; frequently, only the deep, flared peristomes were immediately evident. This feature, and the nodular frontal shield, with marginal pores only, govern the inclusion of this species in *Nimba*. It is distinguished from other members of the genus (Gordon, 1984, 1989a) by its broad sinus and almost tubular peristome.

ETYMOLOGY

Latin, *saxatilis*, found among rocks.

Family STOMACHETOSSELLIDAE Canu and Bassler, 1917

Cigclisula fruticosa sp. nov.
(Figs 11F, 12A,B)

MATERIAL EXAMINED

HOLOTYPE: QMG304950, Stn. 27.

PARATYPE: QMG304979, Stn. 27.

DESCRIPTION

Colony erect, branching, with broad, lobed, regularly dividing branches up to 8mm wide; developing a compact, rigid, three-dimensional structure, 70 x 50mm, 45mm high. Autozooids hexagonal to irregularly polygonal, large, thickly calcified, strongly convex, separated by distinct sutures: 0.7-0.9 x 0.4-0.5mm. Frontal shield finely granular, with large, widely spaced marginal pores, and a few large, irregularly distributed frontal pores; calcification thickens through ontogeny, developing irregular ridges and knobs between the pores. Primary orifice longer than wide, proximal border almost straight, with a short, U-shaped median sinus occupying about

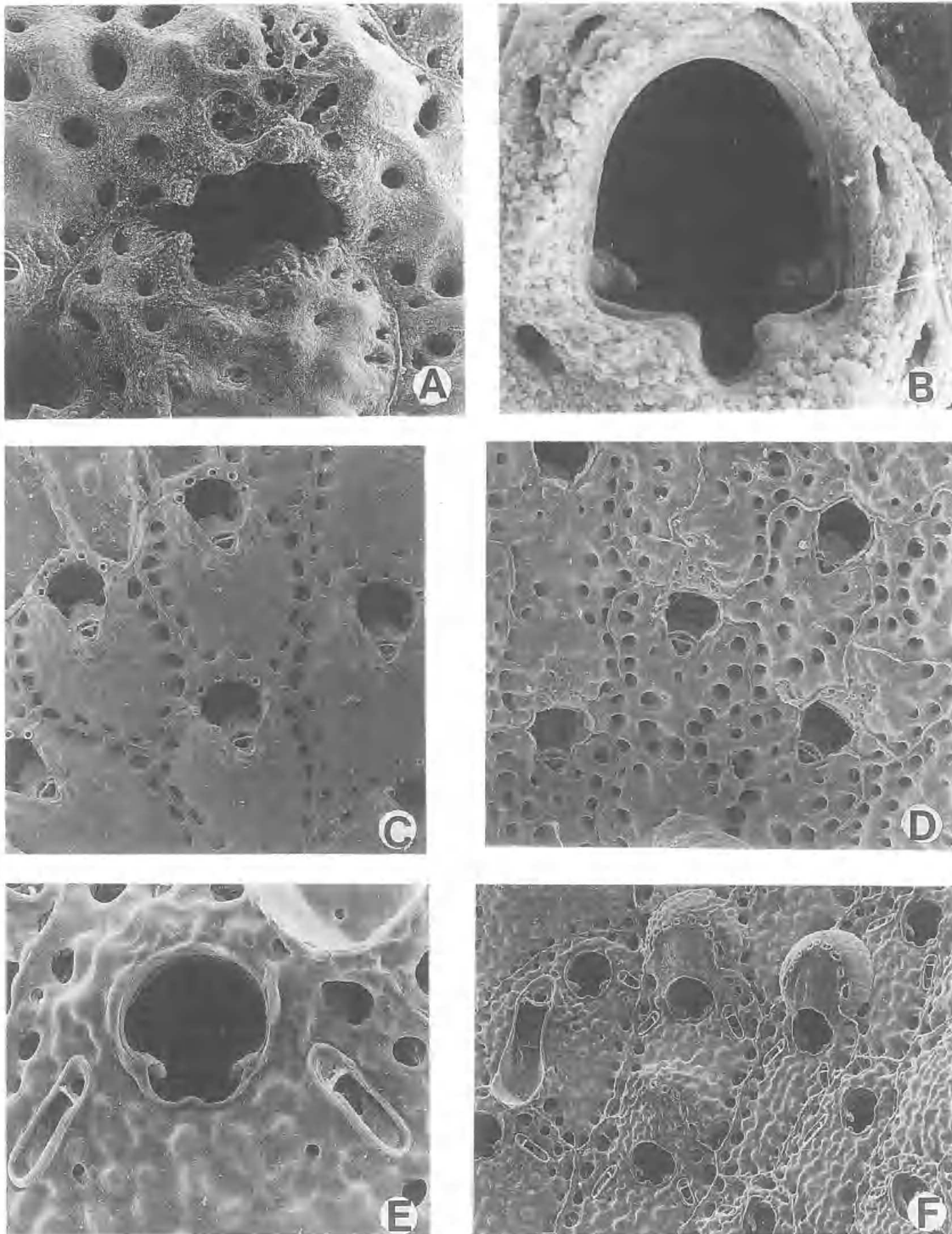


FIG. 12. A,B, *Cigclisula fruticosa*. A, ovicelled autozooid, x90. B, primary orifice, x250. C,D, *Smittoidea incucula*. C, autozooids at the colony edge, x80. D, ovicelled autozooids, x70. E,F, *Pleurocodonellina laciniosa*. E, primary orifice and avicularia, x180. F, ovicelled autozooids and an enlarged avicularium, x55.

one quarter its total width; large, blunt condyles conspicuous in proximo-lateral corners; no oral spines. A low thickened peristome developing in early ontogeny, obscuring but not completely hiding the orifice, its rim variously produced into low, blunt processes. Adventitious avicularia dimorphic: characteristically small, oval, 0.05mm long, with finely toothed rostrum, situated lateral to sinus, acute to frontal plane and laterally directed; rarely larger, 0.2mm long, with elongate oval rostrum. Large vicarious avicularia occur sporadically, the cystid almost as large as an autozoid, bearing a broadly spatulate rostrum, up to 0.4mm long. Additional small adventitious avicularia may be present around the peristomial rim of the autozoid, or elsewhere on the frontal shield. Ovicell longer than wide, convex, conspicuous, bordered by large marginal pores and with a medio-frontal group of about six large, cribrate pores.

Measurements (means and standard deviations of 20 values, mm): autozoid length 0.78 ± 0.06 ; width 0.42 ± 0.04 ; orifice length 0.18 ± 0.006 ; width 0.15 ± 0.005 .

REMARKS

This species is most similar to *C. occlusa* (Busk), which has been accorded a wide, and perhaps spurious, geographical distribution from the Torres Straits to the Philippines, and west to the Red Sea. *C. fruticosa* is distinguished immediately from *C. occlusa* by its elongate, narrowly sinuate orifice, and massive condyles. Ryland and Hayward (1992) recorded *C. areolata* (Kirkpatrick) from Heron Island; both *C. areolata* and *C. cautum* Hastings have been reported previously from the GBR (Hastings, 1932).

ETYMOLOGY

Latin, *fruticosa*, bushy.

Family SMITTINIDAE Levinsen, 1909

Smittioidea incucula sp. nov.
(Fig. 12C,D)

MATERIAL EXAMINED

HOLOTYPE: QMG304952, Stn. 16.

DESCRIPTION

Colony an encrusting, multilaminar sheet. Autozooids polygonal to irregular in outline, convex, separated by thin, raised sutures. Primary orifice slightly wider than long; distal edge with

indistinct denticulation; proximal edge with a conspicuous, thickened lyrula, with convex edge and rounded corners, occupying about half its width; condyles narrow, downcurved, with finely toothed edges. Six distal oral spines present in early ontogeny, obscured by the development of a thin, raised peristome. Frontal shield irregularly nodular, with large, round marginal pores in single or double series. Avicularium almost perpendicular to lyrula, enclosed within peristome; wedge-shaped, broadest across the pivot bar, tapered distally; a thick columella present. Ovicell as broad as long, flattened frontally, with numerous irregularly sized pores; obscured by a sutured ooecial cover.

Measurements (means and standard deviations of 10 values, mm): autozoid length 0.52 ± 0.07 ; width 0.33 ± 0.04 ; orifice length 0.12 ± 0.01 ; width 0.12 ± 0.005 .

REMARKS

There are relatively few tropical species of *Smittioidea*, and in reef habitats the genus is usually overshadowed by a diverse fauna of *Parasmittina* species. *Smittioidea incucula* is readily distinguished from other described species by its large, anvil-shaped lyrula and downcurved condyles, and the six distal oral spines. It was not common on the Heron Island reef flat, occurring in just two samples.

ETYMOLOGY

Latin, diminutive of *incus*, an anvil.

Pleurocodonellina laciniosa sp. nov.
(Fig. 12E,F)

TYPE MATERIAL

HOLOTYPE: QMG304956, Stn. B30.

DESCRIPTION

Colony a broad, multilaminar sheet. Autozooids hexagonal to irregularly polygonal, slightly convex, separated by distinct raised sutures. Primary orifice as wide as long, more or less flush with frontal plane of autozoid; proximal edge with a short, rounded-triangular median projection, variably developed; condyles conspicuous, oval, downcurved, with finely serrated edges revealed by SEM. Two very small distal oral spines present in earliest ontogeny, obscured by the development of a low peristomial rim. Frontal shield coarsely nodular, with a single series of large marginal pores. Avicularia lateral suboral, single or paired (or absent), dimorphic;

narrowly elliptical, 0.1mm long, with a slender crossbar, large palatal foramen and oval opesia, proximo-laterally directed; less frequently, enlarged, to 0.3mm long, parallel-sided, with cupped, narrowly spatulate distal end and extensive palatal foramen, crossbar thick, opesia oval. Ovicell about as wide as long, flattened frontally, with a ring of large frontal pores; initially smooth, but developing a nodular ooecial cover.

Measurements (means and standard deviations of 20 values, mm): autozoid length 0.55 ± 0.07 ; width 0.37 ± 0.04 ; orifice length 0.12 ± 0.006 ; width 0.12 ± 0.004 .

REMARKS

The open orifice, which is scarcely immersed, and parallel-sided avicularia, with oval proximal opesiae seem characteristic of this genus, as do the downcurved condyles. *P. clavícula* Ryland & Hayward (1992) has a very similar ovicell to *P. laciniosa*, but is distinguished by its primary orifice, which is deeply concave proximally, with much narrower condyles.

Family MICROPORELLIDAE Hincks, 1877

Microporella lunifera (Haswell) (Fig. 13A)

Lepralia lunifera Haswell, 1881: 40.

Microporella lunifera (Haswell) Harmer, 1957: 965

MATERIAL EXAMINED

Sta. 25.

DESCRIPTION

Colony an encrusting, unilaminar sheet. Autozooids elongate oval, convex, separated by deep grooves; $0.5\text{--}0.7 \times 0.4\text{--}0.5\text{mm}$. Frontal shield finely nodular, punctured by numerous tiny pseudopores, and with a few slightly larger marginal pores. Primary orifice longer than wide, with seven oral spines; ascopore close to proximal border of orifice, separated from it by a distance equivalent to less than the orifice length; with a thickened, broadly oval rim and a broad, finely toothed, reniform lumen. Avicularia paired, lateral, situated mid-way between ascopore and orifice, directed disto-laterally; the rostrum is short and shovel-shaped, to accommodate a long, setiform mandible. Ovicell recumbent on distally succeeding autozoid; small, spherical, the calcification densely nodular except for a smooth area above the aperture; there is a peripheral ring of large pores.

REMARKS

This species was introduced cursorily, and without illustration, by Haswell (1881) in his account of Queensland Bryozoa. Harmer (1957) described a specimen from Holborn Island, Torres Straits. This record from Heron Island is only the third occurrence of the species; the specimen figured here has been compared with that described by Harmer (1957) and found to match it exactly.

Fenestrulina epiphytica sp. nov. (Fig. 13B,C)

MATERIAL EXAMINED

HOLOTYPE: QMG304960, on *Sargassum* sp.

PARATYPE: QMG304964, on *Sargassum* sp.

DESCRIPTION

Colonies developing small, rounded, unilaminar patches. Autozooids oval, small, separated by distinct grooves; boundaries of incurved vertical walls marked by a low ridge around the frontal shield. Primary orifice wider than long; no distal oral spines. Ascopore situated almost exactly in the middle of the frontal shield, with a thick, transversely oval rim; lumen crescentic, without denticulations. A single series of large, round pores borders the frontal shield, and continues around the distal edge of the orifice; a double series of pores extends between the ascopore and the primary orifice. Ovicell as wide as long, rather flat, smooth-surfaced; ectooecial calcification limited to an indistinct ridge on the frontal shield of the succeeding autozoid, with a series of small, irregular pores between it and the entoecium. The orifice of brooding autozooids is noticeably larger than that of sterile autozooids.

Measurements (means and standard deviations of 20 values, mm): autozoid length 0.41 ± 0.04 ; width 0.30 ± 0.03 ; orifice length 0.09 ± 0.005 ; width 0.12 ± 0.007 .

REMARKS

This small *Fenestrulina* is especially characterised by its incurved gymnocystal, lateral walls, and the distinct rim bordering the frontal shield. The ascopore is also unusually large in relation to the extent of the frontal shield. It was found only on *Sargassum* leaflets.

ETYMOLOGY

Greek, *epi-*, upon, *phyton*, plant.

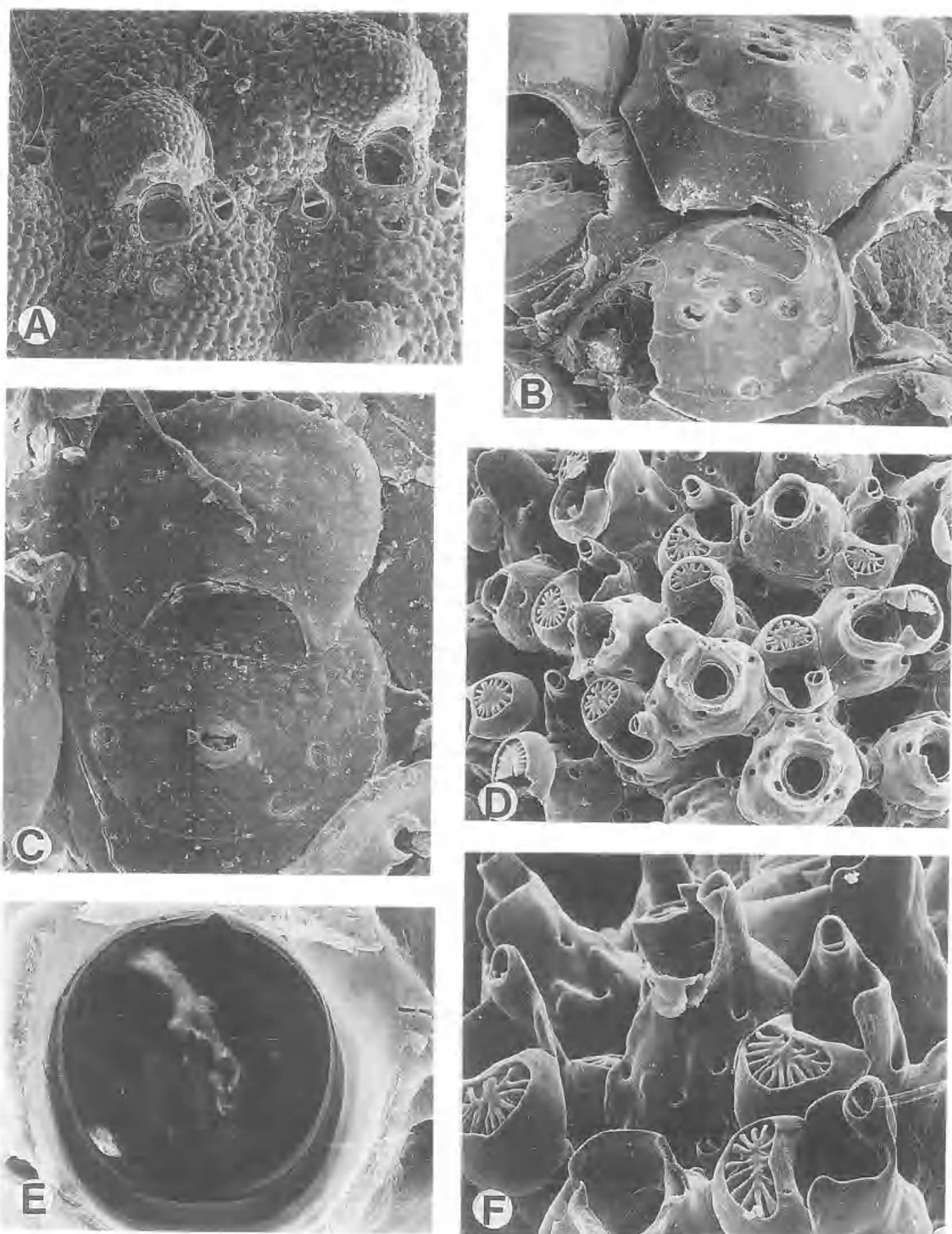


FIG. 13. A, *Microporella lunifera*, x70. B,C, *Fenestrulina epiphytica*. A, portion of a colony, x110. B, detail of an ovicelled autozooid, x140. D-F, *Celleporina bellatula*. D, portion of colony, including ovicelled autozooids, x60. E, primary orifice, x450. F, detail showing peristomes in profile, x110.

Superfamily CELLEPOROIDEA

Johnston, 1838

Family CELLEPORIDAE Johnston, 1838

Celleporina bellatula sp. nov.

(Fig. 13D-F)

MATERIAL EXAMINED

HOLOTYPE: QMG304971, Stn. 28.

PARATYPES: QMG304969, Stn. 28.

DESCRIPTION

Colony pisiform, minute, 1-2mm diameter in the present material. Autozooids small, fusiform, smoothly calcified, closely packed so that the orifice and peristome are terminal in position and little of the frontal shield can be seen in later ontogeny; each has about five small marginal pores. Primary orifice slightly longer than wide, about 0.09×0.085 mm; proximal edge with a short V-shaped sinus occupying about one-third its total width, condyles narrow, indistinct, except for a short peak disto-laterally. Peristome well developed, erect, slightly flared, with an indistinct notch medio-proximally, adjacent to a single columnar avicularian cystid; rostrum 0.05mm long, oval, terminal, acute to plane of orifice and directed obliquely laterally. Large vicarious avicularia were not found. Ovicell slightly wider than long, not encroached upon by the peristome; tabula large, with an almost straight proximal edge; crossed by finely calcified, slender struts of ectoecial calcification, fusing medially with the underlying entoecium.

REMARKS

Numerous colonies of this tiny species were collected from Station 28, encrusting a large tuft of *Nellia simplex*. In its single, laterally directed suboral avicularium it resembles *C. rostellata* Harmer (1957). That species, however, is characterised by a very broad primary orifice, with a wide sinus occupying most of its proximal width, and a proportionately larger avicularium. *C. rostellata* has numerous vicarious avicularia, with a broad, rounded, scaphoid rostrum.

ETYMOLOGY

Latin, *bellatula*, diminutive of *bellus*, beautiful.

Celleporina cochlearia sp. nov.

(Fig. 14A,B)

MATERIAL EXAMINED

HOLOTYPE: QMG304976, Heron Id., on *Sargassum* sp.

DESCRIPTION

Colony a small, domed patch, 2-3mm diameter. Autozooids small, tumid, smoothly calcified, with few, large marginal pores. Primary orifice terminal, 0.10mm long, about as wide as long; rather angular, the proximal edge concave, between indistinct condyles. Peristome developed from a pair of large septula flanking the orifice; short and thick laterally, thickened and umbonate proximally; incorporating a single median suboral avicularium, with short oval rostrum, acute to orifice plane and proximally directed. Ovicell more or less hemispherical; tabula flat and occupying most of frontal surface, with irregular slits around its periphery. Vicarious avicularium distinctive, 0.3mm long, broadest across the slender crossbar; proximal portion more or less semicircular, rostrum long and slender, only half width across condyles, almost parallel-sided with a smoothly rounded tip.

REMARKS

This small *Celleporina* occurred only on *Sargassum*, but was abundant in the samples collected. It is especially characterized by its single, median suboral avicularium, by the broad frontal tabula to the ovicell, and by the long, slender avicularium, which resembles a cook's ladle.

ETYMOLOGY

Latin, *cochlear*, a ladle.

Celleporina fistulata sp. nov.

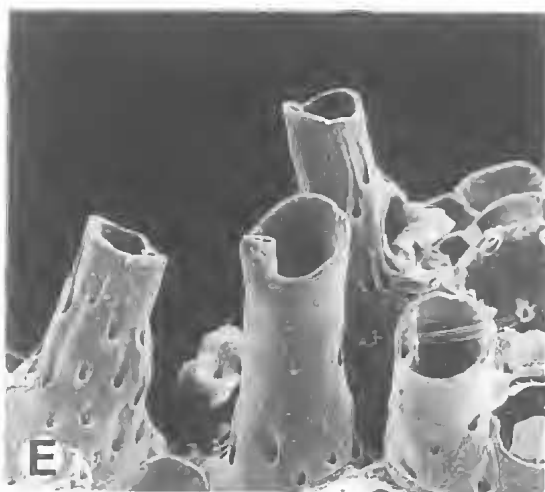
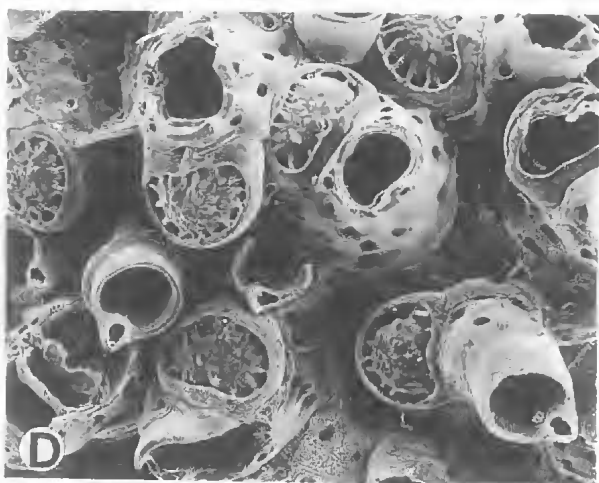
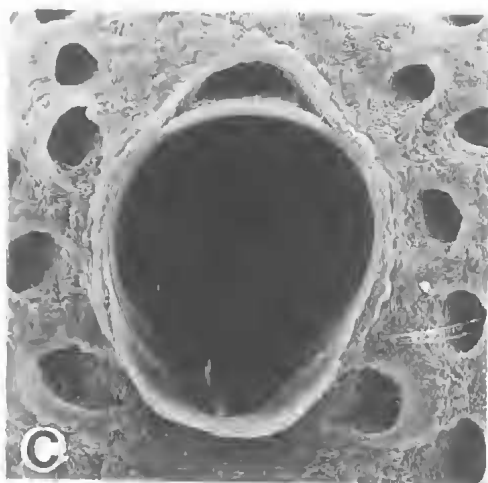
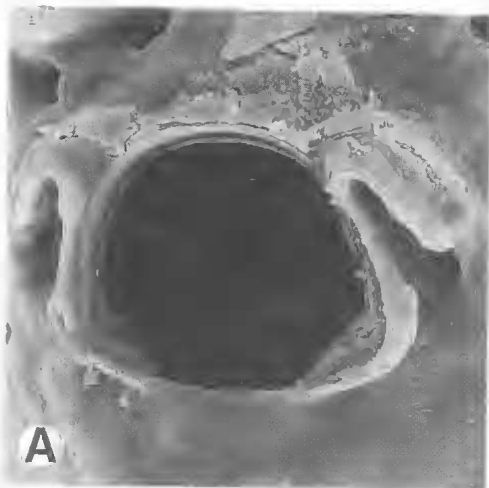
(Fig. 14C-E)

MATERIAL EXAMINED

HOLOTYPE: QMG304973, Stn. 28.

DESCRIPTION

Colony pisiform, or cylindrical. Autozooids oval and convex when newly budded; calcification smooth, with one or two proximal marginal pores, and a triple series of closely spaced pores around the distal half of the autozoid; $0.4-0.45 \times c.0.3$ mm. Primary orifice pear-shaped, longer than wide, 0.12×0.08 mm, the proximal edge deeply sinuate between inconspicuous condyles; no oral spines. Peristome developed as an erect tube, 0.4-0.5mm high, completely hiding orifice, smoothly calcified, with tubular extensions of the autozoid pores around its basal half. A single, tubular avicularium incorporated within the peristome, its rostrum triangular, 0.06mm long, situated on the proximo-lateral rim, slightly acute to secondary aperture, directed outwards. Other avi-



cularia not found. Ovicell wider than long, irregularly oval, situated at base of peristome; entoecial tabula occupying most of frontal surface, finely granular, bordered by thickened struts of ectoecium.

REMARKS

This small *Celleporina* is especially characterised by its pear-shaped primary orifice and long, tubular peristome, bearing just a single avicularium on its rim. Colonies were encrusted on *Pleurotoichus clathratus* from Station 28.

ETYMOLOGY

Latin, *fistula*, a pipe.

Celleporina rostellata Harmer (Fig. 14F, 15A,B)

Celleporina rostellata Harmer, 1957: 907, pl. 62, figs 18, 19.

MATERIAL EXAMINED

Numerous colonies on beached *Sargassum* sp.

DESCRIPTION

Colonies developing small patches, nodules or cylinders, 2–3 mm long. Autozooids smoothly calcified, closely packed; frontal shield, visible only in marginal autozooids, with few, relatively large, marginal pores. Primary orifice slightly longer than wide, 0.15 x 0.12 mm; proximal edge with a deep, U-shaped sinus occupying half its total width; condyles low and rounded. Peristome developed in early ontogeny, characteristic: completely surrounding orifice and incorporating a proximo-lateral, suboral avicularium, with oval, vertically orientated rostrum, the distal rim finely denticulate; medio-proximal rim deeply notched, opposite proximo-lateral edge developed as a thickened umbo. The avicularium faces laterally; its proximal edge is produced as a sub-triangular process projecting above the peristomial notch. Ovicell hemispherical with a large frontal tabula, perforated by two rows of irregular pores. Vicarious avicularia frequent, varying in size, up to 0.27 mm long; rostrum slightly broadened distally, and deeply cupped; crossbar complete, with an indistinct median thickening; palate with an extensive foramen.

REMARKS

The specimens described by Harmer (1957), from the Torres Straits (Fig. 15b), had grown as slender cylinders, probably investing hydroid stems. They bear a close resemblance to the Heron Island specimens. This appears to be just the second report of the species, and its first occurrence in the GBR province.

Family PHIDOLOPORIDAE Gabb & Horn
1862

Plesiocleidochasma Soule, Soule & Chaney,
1991

TYPE SPECIES

Lepralia porcellana var. Livingstone, 1926.

DIAGNOSIS

Colony encrusting, unilaminar to multilaminar. Autozooid frontal wall with few marginal perforations; primary orifice orbicular, smooth-rimmed, with sharp, downcurved condyles above a broad, arcuate sinus. Avicularia adventitious, typically latero-proximal to orifice, distally or laterally directed. Ovicell hyperstomial, imperforate, with well-developed labellum, not closed by autozooid orifice.

Plesiocleidochasma normani (Livingstone)

Lepralia porcellana var. *normani* Livingstone, 1926: 92, pl. 8, fig. 1.

Plesiocleidochasma normani (Livingstone) Soule, Soule & Chaney, 1991: 474, pl. 4, fig. 4, pl. 3, fig. 3.

Schedocleidochasma porcellanum (Busk) Ryland & Hayward, 1992: 287, fig. 27c.

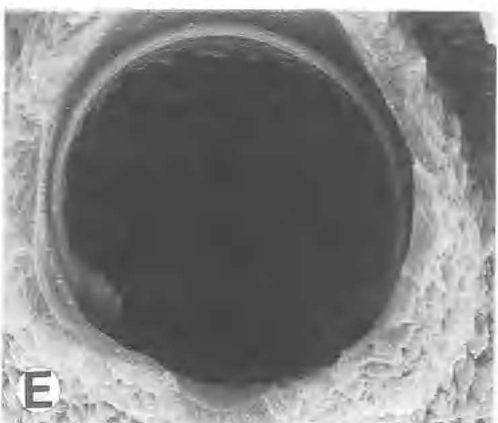
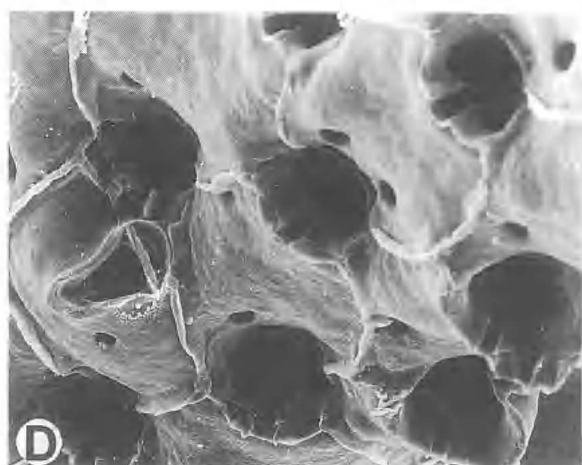
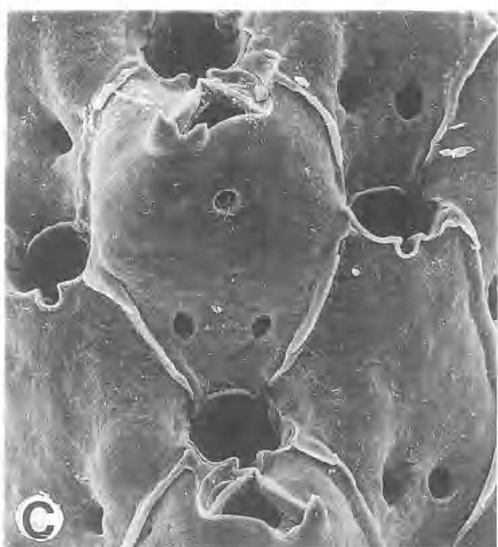
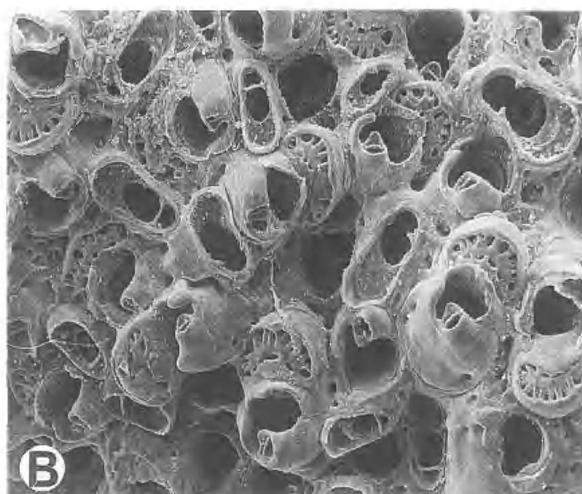
REMARKS

This species was incorrectly attributed to *Schedocleidochasma porcellanum* by Ryland & Hayward (1992). It has proved to be common at Heron Island, occurring at 21 of the sites sampled.

DISTRIBUTION

Plesiocleidochasma normani seems to be widely distributed in the western Pacific. Soule *et al.* (1991) record it from Indonesia, the Solomon

FIG. 14. A,B, *Celleporina cochlearia*. A, primary orifice, x320. B, ovicelled autozooids with characteristic peristome, and vicarious avicularia, x110. C-E, *Celleporina fistulata*. C, primary orifice, x270. D, ovicelled autozooids, x70. E, peristomes in lateral view, x70. F, *Celleporina rostellata*, part of colony, with ovicelled autozooid and vicarious avicularium, x90.



Islands, Fiji and Vanuatu, and eastwards to Tonga, French Polynesia and Hawaii.

Reteporellina denticulata (Busk)
(Fig. 15C,D)

Retepora denticulata Busk, 1884: 109, pl. 26, fig. 1a-d.
Reteporellina denticulata (Busk) Harmer, 1934: 581,
pl. 35, figs 21-23, pl. 38, figs 27-32, text-figs 25D,
33.

DESCRIPTION

Colony architecture indeterminate, generally arising from a narrow basal stalk, developing curved, spreading or twisted lobes of narrow, irregularly dividing branches; fusing irregularly to give an uneven reticulate structure, or partly non-anastomosed; may exceed 40mm height, with equivalent spread. Trabeculae consist of five to nine alternating, longitudinal series of autozooids, each more or less hexagonal, gently convex, separated by distinct raised sutures; commonly 0.5 x 0.3mm. Frontal shield of autozooid smooth, with just two or three large pores marginally, towards its proximal end; thickening steadily through ontogeny, with orifice becoming deeply immersed, sutures more indistinct, but pores remaining visible. Primary orifice wider than long, transversely oval, with small rounded condyles; no oral spines. Peristome with a symmetrical, medio-proximal notch, flanked by prominent, rounded knobs; as this deepens through ontogeny, a deep channel develops on the inner face of the peristome. Avicularia sporadic, suboral, obliquely transversely orientated; the rostrum about 0.2mm long, sharply hooked apically, the tip typically forked. Ovicell pyriform, with a short frontal fissure and a narrow labellum.

DISTRIBUTION

Reteporellina denticulata is widely distributed throughout the tropical Indo-west Pacific region.

Iodictyum mamillatum sp. nov.
(Figs 15E,F, 16A)

MATERIAL EXAMINED

HOLOTYPE: QMG304957, Stn. 27.
PARATYPE: QMG304958, Stn. 27.

DESCRIPTION

Colony an irregular, repent fan shape, supported two or three mm above the substratum by columnar processes developed on its basal surface; area exceeding 20 x 30mm, the edge irregularly folded but not enrolled. Colour dull white. Fenestrulae small, oval, commonly 1.0 x 0.5mm; trabeculae stout, consisting of three or four alternating, longitudinal autozooid series, doubled at points of trabecular fusion. Autozooids hexagonal, becoming irregularly polygonal in later ontogeny, rather flat, separated by distinct raised sutures; 0.3-0.4 x 0.15-0.2mm. Frontal shield finely granular, with two to four, rarely more, large and distinct pores close to its proximal margins; typically, each autozooid bears a pair of prominent, smoothly conical umbones proximolateral to the peristome. Primary orifice orbicular, as wide as long, the proximal border shallowly concave; condyles bluntly rounded, conspicuous; distal rim with relatively large denticulations. No oral spines. A mid-proximal pseudospiramen forms in early ontogeny, developing as a clearly defined tube as the peristome forms; peristome encircling and obscuring primary orifice, with an orbicular secondary aperture, its rim produced into about ten short, blunt, spikes, but without clear internal ridges. Frontal avicularia sporadic, shoe-shaped, normal to frontal plane, with varying orientation; 0.1mm long. Less frequently, slightly larger avicularia occur, 0.1-0.15mm long, with narrow triangular rostrum, acute to frontal plane. Larger avicularia with irregularly spatulate rostrum, 0.2-0.25mm long, occasional, usually borne by autozooids on the margins of the fenestrulae. Ovicells not developed in the present material.

REMARKS

Two colonies only were found. Both had developed as irregular spreading fans with their frontal surfaces more or less parallel to the substratum surface, and attached to it by the thickened base of the colony, and by short, stoutly calcified processes developed from the basal surfaces.

ETYMOLOGY

Latin, *mamillatus*, breast-shaped.

FIG. 15. A,B, *Celleporina rostellata*. A, primary orifice, Heron Island specimen, x330. B, part of the holotype, Torres Straits, x55. C,D, *Reteporellina denticulata*. C, group of autozooids with characteristic avicularia, x120. D, oblique view to show peristomes, x130. E,F, *Iodictyum mamillatum*. E, primary orifice, x550. F, group of autozooids with characteristic umbones and avicularia, x90.

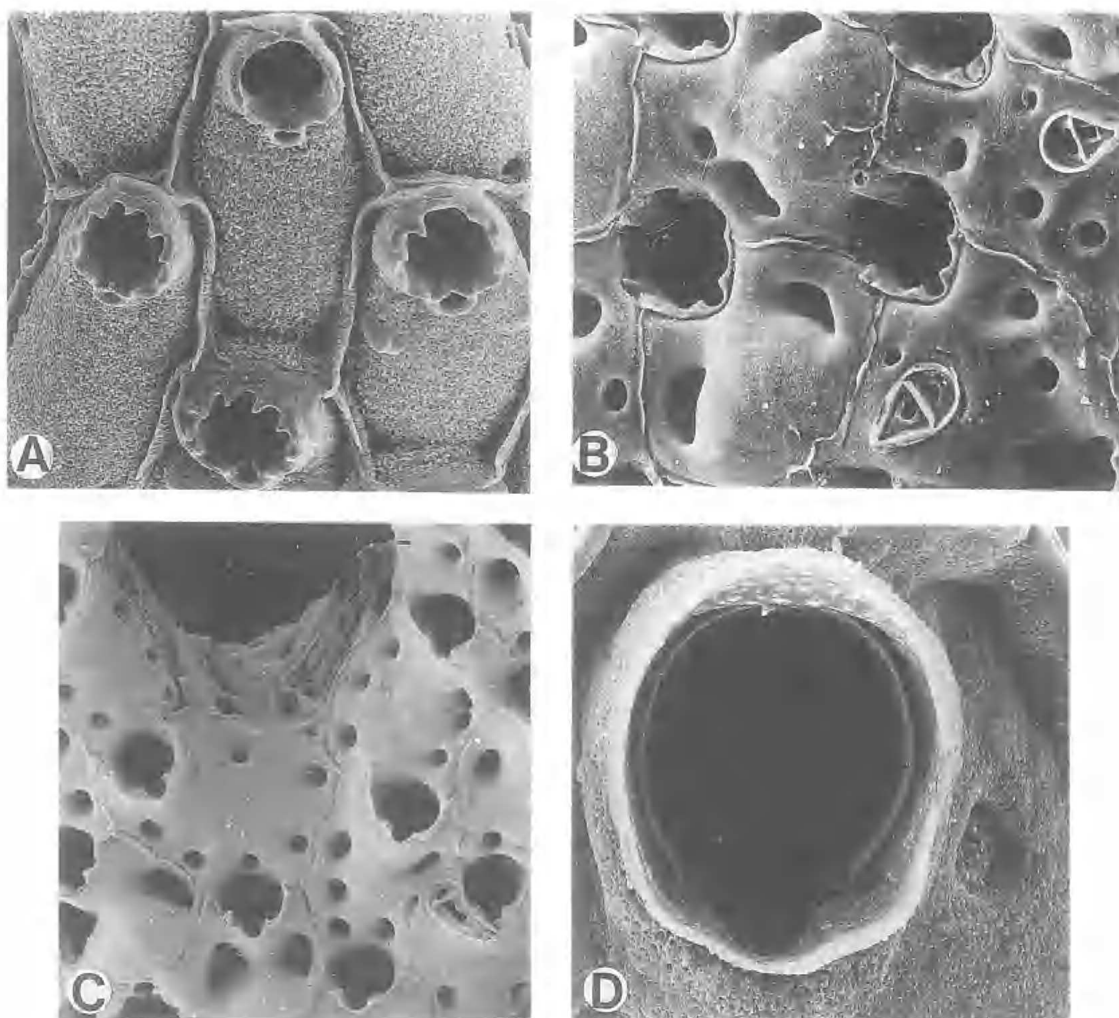


Fig. 16. A, *Iodictyum mamillatum*, autozooids at the growing edge, showing development of peristome, x130. B-D, *Iodictyum receptaculum*. B, ovicelled autozooids, x110. C, autozooids at a fenestrula, with a peristomial avicularium, and a vicarious avicularium, x70. D, primary orifice, x350.

***Iodictyum receptaculum* sp. nov.**
(Fig. 16B-D)

MATERIAL EXAMINED

HOLOTYPE: QMG304949, Stn. 27.

DESCRIPTION

Colony 35mm high, with horizontal spread of 50mm, its basal portion forming a short peduncle, the free edge lobed and folded, the lobes fused at one or two points, resembling a flower basket. Colour deep magenta. Fenestrulae broadly oval, rather small, commonly 1.5 x 1.0mm; trabeculae consisting of four alternating longitudinal series of autozooids, doubled at points of trabecular

fusion. Autozooids hexagonal to polygonal, convex, separated by distinct raised sutures; 0.4-0.45 x 0.2-0.25mm. Frontal wall smooth, with four to six very large marginal pores. Primary orifice pyriform, broadest distally, tapered proximally to a deep U-shaped sinus which occupies whole of proximal edge; condyles small and rounded, distal denticulations comparatively large, distinct. No oral spines. Peristome projecting when newly developed, later submerged by thickening calcification and opening flush with autozooid surface; with a symmetrical, semicircular notch mid-proximally, continued within the peristome as a defined groove; rim produced into four or five indistinct peaks on each side, not markedly

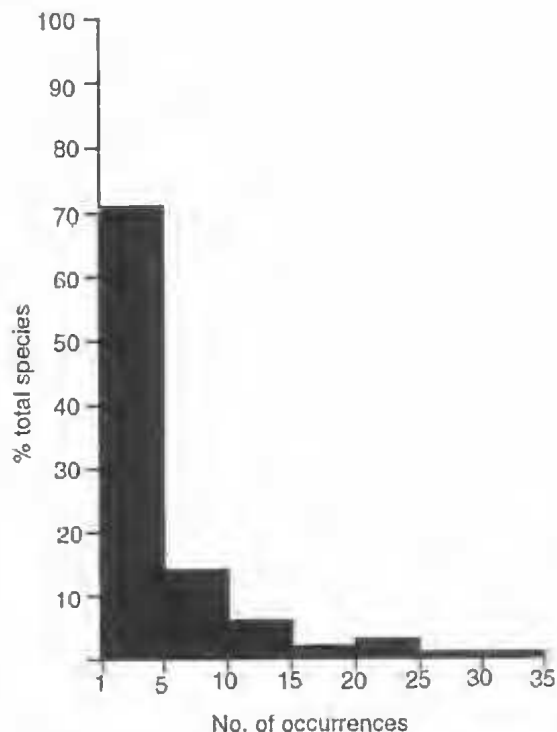


Fig. 17. Species richness at 54 hard-substratum stations.

ribbed on its inner surface. Avicularia sporadic, on frontal shield of autozooids, 0.1–0.15 mm long, rostrum elongate triangular, slightly acute to frontal plane, with variable orientation. Rarely, a suboral avicularium present, with inflated cystid proximo-lateral to peristome and slightly curved, slender rostrum, 0.2 mm long, orientated transversely across proximal edge of peristome. Within the proximal edge of each fenestrula a larger avicularium, with slender, lanceolate rostrum, 0.3 mm long. Ovicell pyriform, with a short median fissure and a very long, narrow labellum.

REMARKS

This species differs from most of the known pigmented species of *Iodictyum* in its smooth peristome. It is most similar to *I. buchneri* Harmer, but is distinguished from that species by its deeper coloration, pyriform primary orifice, and slender infrafenestral avicularium. *Iodictyum buchneri* does not seem to develop the sporadic suboral avicularia seen in *I. receptaculum*.

ETYMOLOGY

Latin, *receptaculum*, a vessel.

CONCLUSION

Bryozoan material reported here and in Ryland & Hayward (1992) was collected at 54 sampling stations on the reef flat at Heron Island. Additionally, three species of *Bugula* were collected at Blue Pools and a sample of *Sargassum*, probably originating from a bed of the seaweed between Heron and Sykes reefs, was collected from the beach of Heron Cay. A total of 124 species has now been described from these collections, of which 34 were new to science and 32 were not previously recorded for Australian seas. It is worth restating that of the remaining 58 species few have been adequately described or illustrated in recent decades, and only a very small number of the species described in previous accounts of the GBR Bryozoa (notably Livingstone, 1927; Hastings, 1932) have been collected again. Taxonomic research on Australian Bryozoa remains slow and difficult. In part this is because the taxonomic diversity of Australian bryozoan faunas has always been underestimated, and any faunistic survey will produce a significant number of undescribed species. However, another major problem is the taxonomic confusion surrounding the identity of many species. The lengthy synonymies, and lists of specimens, assembled by Harmer (1957) cannot be relied upon, and species records by earlier authors, unsupported by descriptions or figures, have to be continually reviewed. In all instances it is almost always necessary to re-examine type and other published materials before specimens may be assigned to little-reported or long-unused taxa. Taxonomic precision is greatly aided by scanning electron microscopy, and taxonomic research on Australian Bryozoa will become progressively easier as the fauna is redescribed, and illustrated with high quality SEM micrographs. Bock's (1982) account of the South Australian fauna and Gordon's (1984, 1986, 1989a) works on the New Zealand Bryozoa are models for this type of study.

Some preliminary ecological conclusions may be drawn from this survey of Heron Island reef flat bryozoans. Most obvious is the difference between the hard substratum fauna and that of the single, and perhaps unrepresentative, sample of *Sargassum*. Fifteen species were found growing on *Sargassum* leaflets, but only two, *Aetea anguina* and *Rhynchozoon tubulosum*, were also recorded on coral rubble. The 13 species found only on *Sargassum* included two known epiphytes, *Membranipora tuberculata* and *Electra*

bellula, but no less than six new species, together with another, *Chaperia* sp., which could not be confidently assigned to any described species. The fifty-four hard substratum samples thus yielded 111 species of Bryozoa; the most diverse sample (Stn.25) contained 41 species, while the mean number of species per station was 10.77. The standard deviation (8.49) is high, most stations yielded just 1-5 species, and a simple plot of the data suggests a non-random distribution (Fig.17). The most abundant species was *Hippopodina feegeensis*, a common reef flat species in the Indo-West Pacific, which was present as broad spreading sheets in 32 of the samples. Seven other species together account for more than half the total species occurrences: *Stylopoma duboisii* (29), *Parasmittina hastingsae* (22), *Pleurocodonellina signata* (20), *Plesioleiodochasma normani* (21), *Rhynchozoon compactum* (20), *R. splendens* (22) and *R. tubulosum* (23). The first four were generally present as spreading unilaminar or multilaminar sheets, while the three species of *Rhynchozoon* formed small patches or nodules.

ACKNOWLEDGEMENTS

We are grateful to the Nuffield Foundation for the provision of a Travelling Fellowship to JSR (1971/72), to the Royal Society for a travel grant in 1988, and to the Australian Biological Resources Survey for generous financial support. Thanks are also due to Dr. Ian Lawn, director of the Heron Island Research Station, and to Mary E. Spencer Jones (Natural History Museum, London). Dr. M.R. Fordy (SBS, University of Wales, Swansea) is thanked for the scanning electron micrography.

LITERATURE CITED

- ABILDGAARD, P.D. 1806. [Descriptis et tabulas]. Pp.1-46 in Müller, O.F.: 'Zoologica Danica, seu Animalium Danicae et Norvegiae rariorum ac minus notorum descriptiones et historia, etc'. Edn.3, Vol.4. Hafniae.
- ALLMAN, G.J. 1856. 'A monograph of the freshwater Polyzoa, including all the known species, both British and foreign'. (The Ray Society: London).
- BASSLER, R.S. 1935. Bryozoa. Generum et Genotyporum. Index et Bibliographica. In Quenstedt, W. (ed.), 'Fossilium Catalogus 1: Animalia'. Pt.67, 1-229. (W. Junk: 's Gravenhage).
1936. Nomenclatorial notes on fossil and recent Bryozoa. Journal of the Washington Academy of Science 26: 156-162.
- BLAINVILLE, H.M.D.DE. 1830. 'Zoophytes'. Vol.60 in Cuvier, G.F.: 'Dictionnaire des sciences naturelles, dans lequel on traite méthodiquement des différents êtres de la nature... par plusieurs professeurs du Muséum National d'Histoire Naturelle et des autres principales écoles de Paris.' (F.G. Levrault: Paris).
- BOCK, P.E. 1982. Bryozoans (Phylum Bryozoa). Pp.319-394 in Shepherd, S.A. & Thomas, L.M.: 'Marine invertebrates of Southern Australia'. Part 1. (Government Printer: Adelaide).
- BORG, F. 1926. Studies on Recent Cyclostomatous Bryozoa. Zoologiska Bidrag från Uppsala 10: 181-507.
1944. The stenolaematous Bryozoa. Further zoological Results of the Swedish Antarctic Expedition, 1901-1903. 3(5): 1-276.
- BOSC, L.A.G. 1802. 'Histoire naturelle des vers.' Vol.3 in Buffon, G.L.L.de: 'Histoire naturelle de Buffon, classée... d'après le système de Linné... par R.R. Castel... nouvelle édition.' (Déterville: Paris).
- BROOD, K. 1976. Cyclostomatous Bryozoa from the coastal waters of East Africa. Zoologica Scripta 5: 277-300.
- BROWN, D.A. 1952. 'The Tertiary Cheilostomatous Polyzoa of New Zealand'. (Trustees of the British Museum (Natural History): London).
- BUSK, G. 1852a. An account of the Polyzoa and Serpularian Zoophytes, collected in the voyage of the 'Rattlesnake' on the coast of Australia and the Louisiade Archipelago, etc. Appendix no.IV. Pp.343-402. In MacGillivray, J., 'Narrative of the Voyage of H.M.S. Rattlesnake'. (T. & W. Boone: London). Vol.1, 402pp.
- 1852b. 'Catalogue of marine Polyzoa in the collection of the British Museum'. 1: 1-54. (Trustees of the British Museum: London).
1854. 'Catalogue of marine Polyzoa in the collection of the British Museum'. 2: 55-120. (Trustees of the British Museum: London).
1859. 'A monograph of the fossil Polyzoa of the Crag'. (Palaeontographical Society: London).
1881. Descriptive catalogue of the species of *Cellepora* collected on the 'Challenger' Expedition. Journal of the Linnean Society, Zoology 15: 341-356.
1884. Report on the Polyzoa collected by H.M.S. Challenger during the years 1873-76. Part 1, The Cheilostomata. Report on the Scientific Results of the Voyage of H.M.S. Challenger, Zoology 10(30): 1-216.
- CANU, F. 1904. Les Bryozoaires du Patagonien. Échelle des Bryozoaires pour les terrains tertiaires. Mémoires de la Société Géologique de France, Paléontologie 12(3) 1-30.
- CANU, F. & BASSLER, R.S. 1917. A synopsis of American Early Tertiary cheilostome Bryozoa. Bulletin of the United States National Museum 96: 1-87.

1927. Classification of the cheilostomatous Bryozoa. Proceedings of the United States National Museum 69(14): 1-42.
1929. Bryozoa of the Philippine Region. Bulletin of the United States National Museum 100: 1-685.
- COOK, P.L. 1968. Bryozoa (Polyzoa) from the coasts of tropical West Africa. Atlantide Report 10: 115-262.
1985. Bryozoa from Ghana: a preliminary survey. Annales du Musée royal de l'Afrique Central (Sciences Zoologiques) 238: 1-315.
- COOK, P.L. & CHIMONIDES, P.J. 1981. Morphology and systematics of some interior-walled cheilostome Bryozoa. Bulletin of the British Museum (Natural History), Zoology 41(2): 53-89.
- DUMONT, J.P.C. 1981. A report on the cheilostome Bryozoa of the Sudanese Red Sea. Journal of Natural History 15: 623-637.
- DUVERGIER, J. 1921. Note sur les Bryozoaires du Néogène de l'Aquitaine. Actes de la Société linnéenne de Bordeaux 72: 5-41.
1924. Deuxième note sur les Bryozoaires du Néogène de l'Aquitaine. Actes de la Société linnéenne de Bordeaux 75: 145-190.
- ELLIS, J. & SOLANDER, D.D. 1786. 'The natural history of many curious and uncommon zoophytes'. (Benjamin White & Son: London).
- FLEMING, J. 1828. A history of British animals, exhibiting their descriptive characters and systematical arrangement of the genera and species of quadrupeds, birds, reptiles, fishes, Mollusca, and Radiata of the United Kingdom. (Bell & Bradburn: Edinburgh).
- GABB, W.M. & HORN, G.H. 1862. The fossil Polyzoa of the Secondary and Tertiary Formations of North America. Journal of the Academy of Natural Sciences of Philadelphia 5(2): 111-179.
- GORDON, D.P. 1984. The marine fauna of New Zealand: Bryozoa: Gymnolaemata from the Kermadec Ridge. Memoirs of the New Zealand Oceanographic Institute 91: 1-198.
1986. The marine fauna of New Zealand: Bryozoa: Gymnolaemata (Ctenostomata and Cheilostomata Anasca) from the western South Island Continental Shelf and Slope. Memoirs of the New Zealand Oceanographic Institute. 95: 1-121.
- 1989a. The marine fauna of New Zealand: Bryozoa: Gymnolaemata (Cheilostomida Ascophorina) from the western South Island Continental Shelf and Slope. Memoirs of the New Zealand Oceanographic Institute. 97: 1-158.
- 1989b. Intertidal bryozoans from coral reef-flat rubble, Sa'aga, Western Samoa. New Zealand Journal of Zoology 16: 447-463.
- 1993a. Bryozoan frontal shields: studies on umbonulomorphs and impacts on classification. Zoologica Scripta 22: 203-221.
- 1993b. Bryozoa: The ascophorine infraorders Cribriomorpha, Hippothoomorpha and Umbonulomorpha mainly from New Caledonian waters. In Crosnier, A. (ed.), 'Résultats des Campagnes Musorstom', Vol.11, Mémoires du Muséum national d'Histoire Naturelle 158: 299-347.
- GRAY, J.E. 1848. 'List of the specimens of British animals in the collection of the British Museum'. Part 1, Centroniae, or radiated animals. (Trustees of the British Museum: London).
- HARMER, S.F. 1902. On the morphology of the Cheilostomata. Quarterly Journal of Microscopical Science 46: 263-350.
1915. The Polyzoa of the Siboga Expedition. Part 1, Entoprocta, Ctenostomata and Cyclostomata. Siboga Expedition Reports 28A: 1-180.
1926. The Polyzoa of the Siboga Expedition. Part 2, Cheilostomata Anasca. Ibid. 28B: 183-501.
1934. The Polyzoa of the Siboga Expedition. Part 3, Cheilostomata Ascophora, Family Reteporidae. Ibid. 28C: 503-640.
1957. The Polyzoa of the Siboga Expedition. Part 4, Cheilostomata Ascophora II. Ibid. 28D: 641-1147.
- HASSALL, A.H. 1840. Catalogue of Irish Zoophytes. Annals and Magazine of natural History 6: 166-175.
- HASTINGS, A.B. 1930. Cheilostomatous Polyzoa from the vicinity of the Panama Canal collected by Dr. C. Crossland on the cruise of the S.Y. "St. George". Proceedings of the Zoological Society of London 1929, No.47: 697-740.
1932. The Polyzoa, with a note on an associated hydroid. Scientific Reports of the Great Barrier Reef Expedition 4(12): 399-458.
- HASWELL, W.A. 1881. On some Polyzoa from the Queensland coast. Proceedings of the Linnean Society of New South Wales 5: 33-44.
- HAYWARD, P.J. 1988. Mauritian Cheilostome Bryozoa. Journal of Zoology, London 215: 269-356.
- HINCKS, T. 1877. On British Polyzoa. Part II, Classification. Annals and Magazine of natural History (4)20: 520-532.
1880. Contributions towards a general history of the marine Polyzoa. II. Foreign Membraniporina. Ibid. (5)6: 81-92, 376-381.
1881. Op. cit. IV, Foreign Membraniporina (second series). Ibid. (5)7: 147-155.
- HONDT, J.L.D. 1985. Contribution à la systématique des Bryozoaires Eurystomes. Apports récents et nouvelles propositions. Annales des Sciences Naturelles, Zoologie, série 13, 7: 1-12.
1986. Bryozoaires de Nouvelle-Calédonie et du plateau des Chesterfield. Bulletin du Muséum National d'Histoire naturelle, Paris (4)8: 697-756.
- JACKSON, J.B.C. & WINSTON, J.E. 1982. Ecology of cryptic coral reef communities. 1. Distribution and abundance of major groups of encrusting organisms. Journal of experimental marine Biology and Ecology 57: 135-147.

- JOHNSTON, G. 1838. 'A history of the British Zoophytes'. (W.H. Lizars: London).
- JULLIEN, J. 1881. Remarques sur quelques espèces des Bryozoaires Cheilostomiens. Bulletin de la Société Zoologique de France 6: 163-168.
1882. Note sur une nouvelle division des Bryozoaires Cheilostomiens. Bulletin de la Société Zoologique de France 6: 271-285.
1883. Bryozoaires. Espèces draguées dans l'océan Atlantique en 1881. Bulletin de la Société Zoologique de France 7: 497-529.
1888. Bryozoaires. Mission scientifique du Cap Horn 1882-1883, 6 (Zoologie part 3): 1-92.
- JULLIEN, J. & CALVET, L. 1903. Bryozoaires provenant des campagnes de l'Hirondelle. Résultats des campagnes scientifiques accomplies par le prince Albert I, 23: 1-188.
- KIRKPATRICK, R. 1890b. Report upon the Hydrozoa and Polyzoa collected by P.W. Bassett-Smith, Esq., Surgeon R.N. during the survey of the Tizard and Macclesfield Banks, in the China Sea, by H.M.S. "Rambler", Commander W.V. Moore. Annals and Magazine of natural History (6)5: 11-24.
- 1890b. Reports on the zoological collections made in Torres Straits by Professor A.C. Haddon, 1888-1889. Hydrozoa and Polyzoa. Scientific Proceedings of the Royal Dublin Society n.s. 6(10): 603-626.
- LAMOUREUX, J.V.F. 1812. Extrait d'un mémoire sur la classification des Polypiers coralligènes non entièrement pierreux. Nouveau bulletin scientifique de la Société Philosophique 3: 181-188.
1816. 'Histoire des Polypiers Coralligènes Flexibles, vulgairement nommés Zoophytes', (F. Poisson: Caen).
1821. 'Exposition méthodique des genres de l'ordre des Polypiers' (V. Agasse: Paris).
- 1824-26. Description des Polypiers flexibles. Pp.603-643 in Quoy, J.R.C. & Gaimard, J.P. 'Voyage autour du Monde...exécutée sur...l'Uranie et la Physicienne...'. (Pillët Aîné: Paris).
- LEVINSEN, G.M.R. 1909. "Morphological and systematic studies on the cheilostomatous Bryozoa". (Nationale Forfatteres Forlag: Copenhagen).
1917. Danmarks Expeditionen til Groenlands nordostkyst 1906-1908. Meddelelser om Grønland 43 (16): 432-472.
- LINNAEUS, C. 1758. 'Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis'. 10th Edn. (Laurentii Salvii: Holmiae).
1767. 'Systema naturae', 12th Edn. (Laurentii Salvii: Holmiae).
- LIVINGSTONE, A.A. 1926. Studies on Australian Bryozoa, No.3. Report on the Bryozoa collected on the Great Barrier Reef, Queensland, in 1925, by W.E.J. Paradise, Lieutenant Surgeon on H.M.A.S. "Geranium", Records of the Australian Museum 15: 79-99.
1927. Studies on Australian Bryozoa, No.5. A checklist of the marine Bryozoa of Queensland. Records of the Australian Museum 16: 50-69.
- MACGILLIVRAY, P.H. 1869. Descriptions of some new genera and species of Australian Polyzoa; to which is added a list of species found in Victoria. Transactions and Proceedings of the Royal Society of Victoria 9: 126-148.
1882. Descriptions of new, or little known, Polyzoa. Transactions and Proceedings of the Royal Society of Victoria 18: 115-121.
- MANZONI, A. 1870. Bryozoi Pliocenici Italiani. Quarta contribuzione. Sitzungsberichte der Akademie der Wissenschaften in Wien (Abt.1)61: 323-349.
- MAWATARI, S. 1974. Studies on Japanese anascan Bryozoa 3. Division malacostega (1). Bulletin of the national Science Museum, Tokyo 17(1): 17-52.
- MAWATARI, S. & MAWATARI, S.F. 1980. Studies on Japanese anascan Bryozoa 5. Division Malacostega. Bulletin of the Liberal Arts and Sciences Course, School of Medicine, Nihon University 8: 21-114.
- MILNE EDWARDS, H. 1836. Observations sur les Polypiers fossiles du genre *Eschare*. Annales des Sciences naturelles, Zoologie (2)6: 321-345.
1838. Mémoire sur les Crisies, les Hornères et plusieurs autres Polypes. Annales des Sciences naturelles, Zoologie (2)9: 193-238.
- NORMAN, A.M. 1864. On undescribed British Hydrozoa, Actinozoa and Polyzoa. Annals and Magazine of natural History (3)13: 82-90.
1903. Notes on the natural History of East Finmark. Annals and Magazine of natural History (7)11: 567-598.
- ORBIGNY, A.D. 1835-1847. "Voyage dans l'Amérique méridionale". (P. Bertrand: Paris; V. Levrault: Strasbourg).
- OSBURN, R.C. 1949. The genus *Parellisina* (Cheilostomata Anasca, Bryozoa). Occasional papers of the Allan Hancock Foundation 10: 1-9.
1950. Bryozoa of the Pacific coast of America. Part 1, Cheilostomata Anasca, Allan Hancock Pacific Expeditions 14(1): 1-269.
- RIDLEY, S.O. 1881. Polyzoa, Coelenterata and Sponges of Franz-Joseph Land. Annals and Magazine of natural History (5)7: 442-457.
- RYLAND, J.S. & HAYWARD, P.J. 1977. British anascan Bryozoans. Linnean Society Synopses of the British Fauna n.s. 10: 1-188.
1992. Bryozoa from Heron Island, Great Barrier Reef. Memoirs of the Queensland Museum 32: 223-301.
- SCHOLZ, J. 1991. Die Bryozoenfauna der philippinischen Riffregion Cebu. Mitteilungen Géologisch-Paläontologisches Institut der Universität Hamburg 71: 253-403.

- SMITT, F.A. 1867. Kritisk forteckning öfver Skandinaviens Hafs-Bryozoa, II. Öfversigt af Kungliga Vetenskaps-Akademiens Förhandlingar 23 (Supplement): 395-534.
1873. Floridan Bryozoa, collected by Count L.F. de Pourtalès. Part II. Kungliga Svenska Vetenskaps-Akademiens Handlingar 11(4): 1-83.
- SOULE, D.F. & SOULE, J.D. 1973. Morphology and speciation of Hawaiian and eastern Pacific Smittinidae (Bryozoa, Ectoprocta). Bulletin of the American Museum of Natural History 152: 365-440.
- SOULE, J.D., SOULE, D.F. & CHANEY, H.H. 1991. New tropical Pacific and Indian Ocean Cleidochasmatidae (Cheilostomata: Ascephora). Bulletin de la Société des Sciences naturelles de l'Ouest de la France, Mémoire HS 1: 465-486.
- STACH, L.W. 1937. Reports of the McCoy Society for Field Investigation and Research. Lady Julia Percy Island. 13. Bryozoa. Proceedings of the Royal Society of Victoria n.s. 49(2): 373-384.
- UTTLEY, G.H. & BULLIVANT, J.S. 1972. Biological results of the Chatham Islands 1954 Expedition. Part 7. Bryozoa Cheilostomata. New Zealand Oceanographic Institute Memoir 57: 1-61.
- VIGNEAUX, M. 1949. Révision des Bryozoaires néogènes du Bassin d'Aquitaine et essai de classification. Mémoires de la Société géologique de France (n.s.) 28: 1-153.
- WINSTON, J.E. 1986. An annotated check list of coral-associated Bryozoa. American Museum Novitates 2859: 1-39.

APPENDIX

List of additional collecting stations.

1. 9 Apr, 1972. Reef flat, Research Station side. thin, plate-like corals with arcos of sand.
 3. 10 Apr, 1972. Reef flat, Wistari Reef side. Collections from tubular *Acropora*, either dead or not in vigorous growth, attached or loose but not obviously thrown up by cyclone 'Emily' (Apr, 1972).
 7. 11 Apr, 1972. Reef flat, western side. Bryozoans from the lower side of an *Acropora*, finger-like rather than tubular.
 9. 11 Apr, 1972. Reef flat, western side. Bryozoans from the underside of a detached tabular *Acropora*, growing around the pedestal together with *Lithothamnion*, a thick red sponge, *Margaretta* and lace-corals.
 10. 11 Apr, 1972. Reef flat, western side. Bryozoans from the underside of an attached, living *Acropora*.
 15. 13 Apr, 1972. Bryozoans on coral rock, from a rapids area flowing through a cleft in the reef edge.
 19. 14 Apr, 1972. Bryozoans from coral boulders on the reef crest.
 27. 21 Apr, 1972. Bryozoans collected at about 20 feet depth along the reef edge.
 28. 22 Apr, 1972. North side of reef, at 20-30 feet depth along the reef edge.
- B1-B30: refer to individual boulders deposited by cyclone 'Emily' (Apr, 1972) between Blue Pool and the Coral Cascades, which were sampled during the period 27 July - 2 August, 1988.